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of Engineers
New Orleans District

PHASE I MARINE AND TERRESTRIAL CULTURAL RESOURCES SURVEY OF 13 PROJECT ITEMS LOCATED ON MARSH ISLAND, IBERIA PARISH, LOUISIANA

September 1999

Final Report

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Prepared For:

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New Orleans District
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19. ABSTRACT (*Continue on reverse if necessary and identify by block number*)

This report presents the results of Phase I cultural resources survey and archeological inventory of two marine and 11 terrestrial project items on and near Marsh Island in Iberia Parish, Louisiana. Approximately 175 linear km (109 linear mi) of marine survey was conducted off of the east coast of Marsh Island in East Cote Blanche Bay. An additional 2.41 linear km (1.5 linear mi) of underwater survey was performed in Hawkins Bayou. The terrestrial portion of the investigation was limited to the northeastern portion of Marsh Island. It included an examination of 11 project items (two shoreline survey areas and nine existing canals) that measured a combined total of approximately 105 ac (42.5 ha) in size.

This investigation was performed between July 20 and August 5, 1998 by R. Christopher Goodwin & Associates, Inc., on behalf of the U.S. Army Corps of Engineers, New Orleans District. All work was authorized under Con-tract No. DACW29-97-D-0018, Delivery Order 11.

The marine remote sensing survey was designed to identify all submerged cultural resources located within the underwater areas of potential effect. It included the use of a side scan sonar, magnetometer, and fathometer. Terrestrial survey was designed to locate all cultural resources within each land-based project item. It included pedestrian survey and shovel testing to identify, record, and assess preliminarily all archeological sites located within the 11 terrestrial project items.

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19. ABSTRACT, continued

This Phase I marine and terrestrial cultural resources survey and archeological inventory resulted in the identification of four potentially significant magnetic anomalies and one historic period locus (Locus 1). No prehistoric cultural material was identified or recovered as a result of this investigation. The four marine targets were assessed as potentially significant and additional examination or avoidance of these four anomalies was recommended. The historic period locus was described as the remains of a twentieth century dock that may have been associated with a now destroyed building; it was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional testing of Locus 1 is recommended.

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT. CORPS OF ENGINEERS
P.O. BOX 60267
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REPLY TO
ATTENTION OF:

May 4, 1999

Planning, Programs
& Project Management Division
Environmental Planning
& Compliance Branch

To the Reader:

This report of investigations was designed, funded, and guided by the U.S. Army Corps of Engineers, New Orleans District, as part of our cultural resources management program. The report was completed as part of the Marsh Island Hydrologic Restoration Project, Iberia Parish, Louisiana.

We concur with the recommendations and commend the efforts of the author. Each of the four marine targets assessed as potentially significant will be avoided. Louisiana's State Historic Preservation Officer has reviewed and concurred with the recommendations by letter dated October 5, 1998.

James Wojtala

James M. Wojtala
Project Archeologist

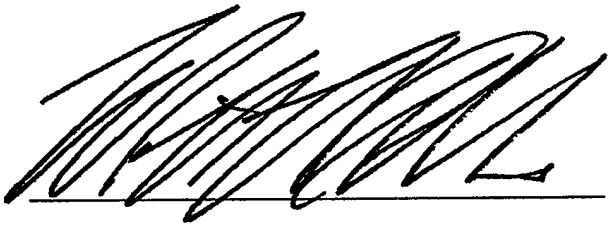
Edwin A Lyon

Edwin A. Lyon
Contracting Officer's
Representative

David A. Vigh
Acting Chief, Environmental
Planning & Compliance Branch

PHASE I MARINE AND TERRESTRIAL CULTURAL RESOURCES SURVEY OF 13 PROJECT ITEMS LOCATED ON MARSH ISLAND, IBERIA PARISH, LOUISIANA

FINAL REPORT



William P. Athens, M.A., A.B.D.
Principal Investigator

By

William B. Barr, J. B. Pelletier, Susan Barrett Smith, Roger T. Saucier, Luis M. Williams, Jr., David W. Trubey, Christine M. Herman, and William P. Athens

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September 1999

For

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CHAPTER I

INTRODUCTION

This report presents the results of Phase I marine and terrestrial cultural resources survey and archeological inventory of 13 project items situated on or near Marsh Island in Iberia Parish, Louisiana (Figure 1). Fieldwork for this investigation was conducted during July and August of 1998 by R. Christopher Goodwin & Associates, Inc., on behalf of the United States Army Corps of Engineers, New Orleans District. This cultural resources survey was completed as part of an overall feasibility study associated with the Marsh Island Hydrologic Restoration Project (TV-5/7); it was funded pursuant to Delivery Order 11 of Contract Number DACW29-97-D-0018.

The current investigation incorporated both marine and terrestrial components. Project items examined as a result of this investigation included: an open water marine instrument survey of an area situated east of Marsh Island; a linear marine instrument survey of Hawkins Bayou; a terrestrial survey of the shoreline extending between Hawkins Bayou and Lake Point; a terrestrial survey of the north shoreline of Lake Sand; and a terrestrial survey of nine existing oil well access canal closure areas (Figure 2, Sheets 1-2). Each project item was examined for evidence of prehistoric and historic period cultural properties. A description of each of the proposed project items is presented below.

The marine portion of the survey included the investigation of approximately 175.42 linear km (109 linear mi) of track line in East Cote Blanche Bay, and an examination of 1.19 linear km (.74 linear mi) of track line that extended from the mouth of Hawkins Bayou to its terminus at an un-named Marsh Island interior lake (Figure 2, Sheet 3). Current project plans call for a portion of East Cote Blanche Bay to be used as a borrow source for dredge material that will be used to stabilize the existing shoreline and that will provide fill for the associated canal closures.

The terrestrial portion of the survey included an examination of 11 project items; these consisted of the Shoreline Protection project area, the Lake Sand Cell Closure survey area, and nine other Canal Closure items. Together, the project areas encompassed approximately 78.2 ac (31.7 ha) of Marsh Island. These tracts were located in portions of Sections 6, 8, 9, 14, 15, 17, 21, and 48 of Township 17S, Range 7E, and within the Russell Sage Foundation Wildlife Refuge and Game Preserve (Figure 2, Sheets 1-3).

The Shoreline Protection project area measured approximately 13.7 m (45 ft) in width and 610 m (2,000 ft) in length, and it encompassed portions of Sections 14 and 15, of Township 17S, Range 7E (Figure 2, Sheet 2). This 4.13 ac (1.67 ha) impact corridor originated at the mouth of Hawkins Bayou and it extended in a northeasterly direction along the north shore of Marsh Island to Lake Point. Although the gradient has yet to be determined, construction plans were designed to stabilize the shoreline through the placement of dredge and borrow material. In addition, a 30.5 cm (12 in) layer of armor stone will be placed over the extant shoreline and along the marsh edge.

The Lake Sand Cell Closure survey area was limited to the north shore of Marsh Island; it included a portion of Section 9 of Township 17S, Range 7E. The survey area was bounded on the south and west by Lake Sand and on the north by West Cote Blanche Bay (Figure 2, Sheet 2). The

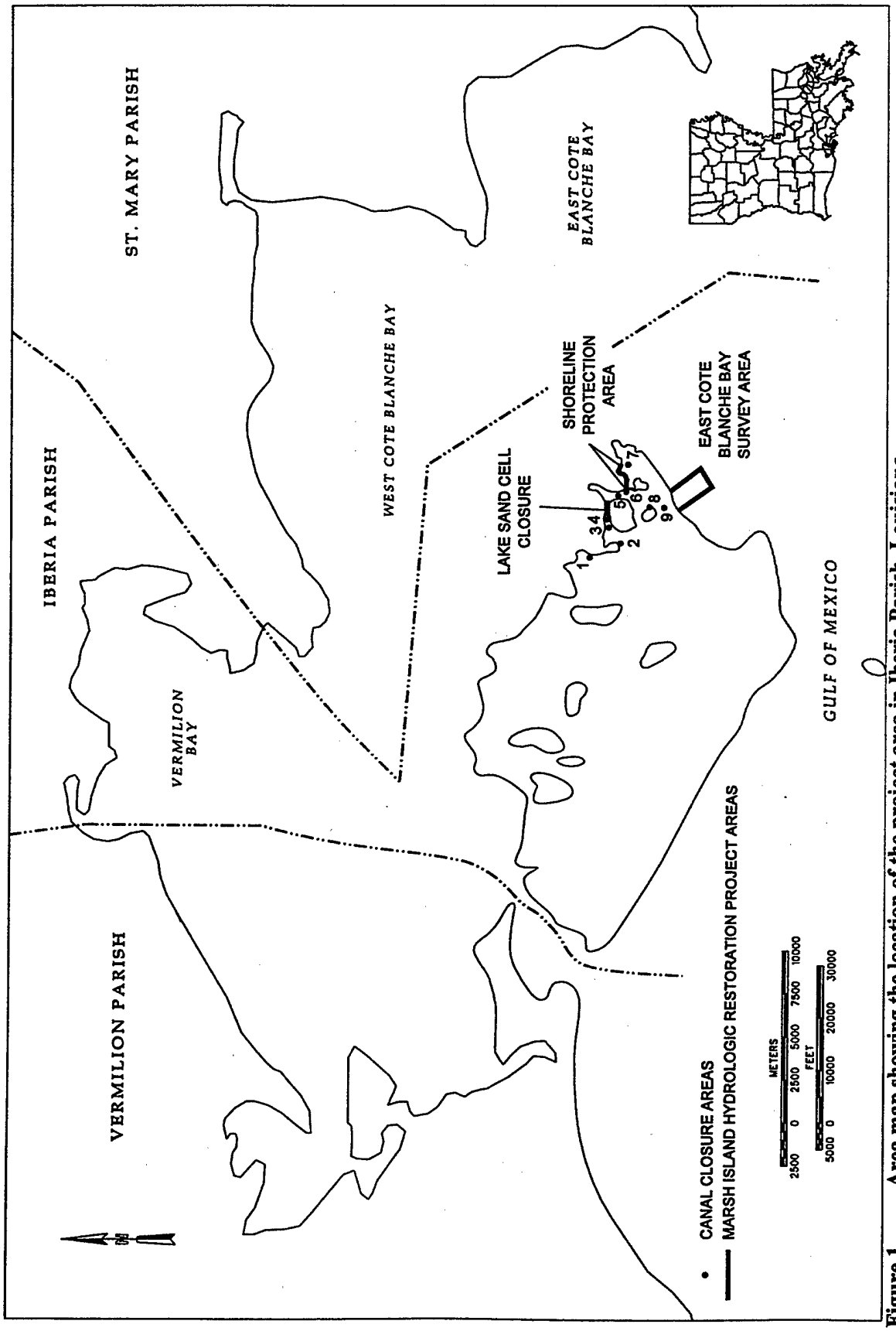


Figure 1. Area map showing the location of the project area in Iberia Parish, Louisiana.

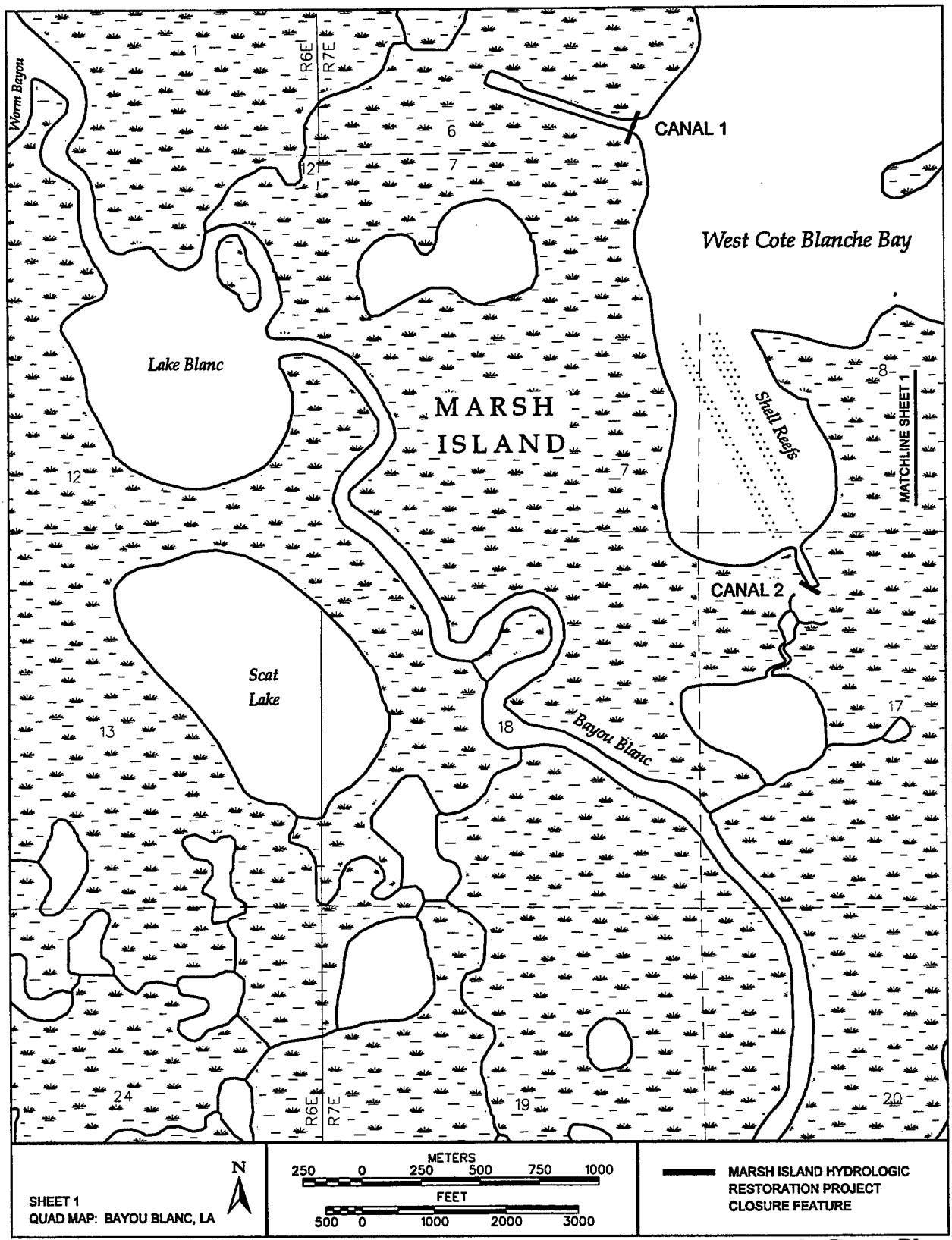


Figure 2. Excerpt from the 1996 digital 7.5 minute series topographic quadrangle, Bayou Blanc, Sheet 1 Louisiana, depicting the Canal 1 and Canal 2 project areas on Marsh Island.

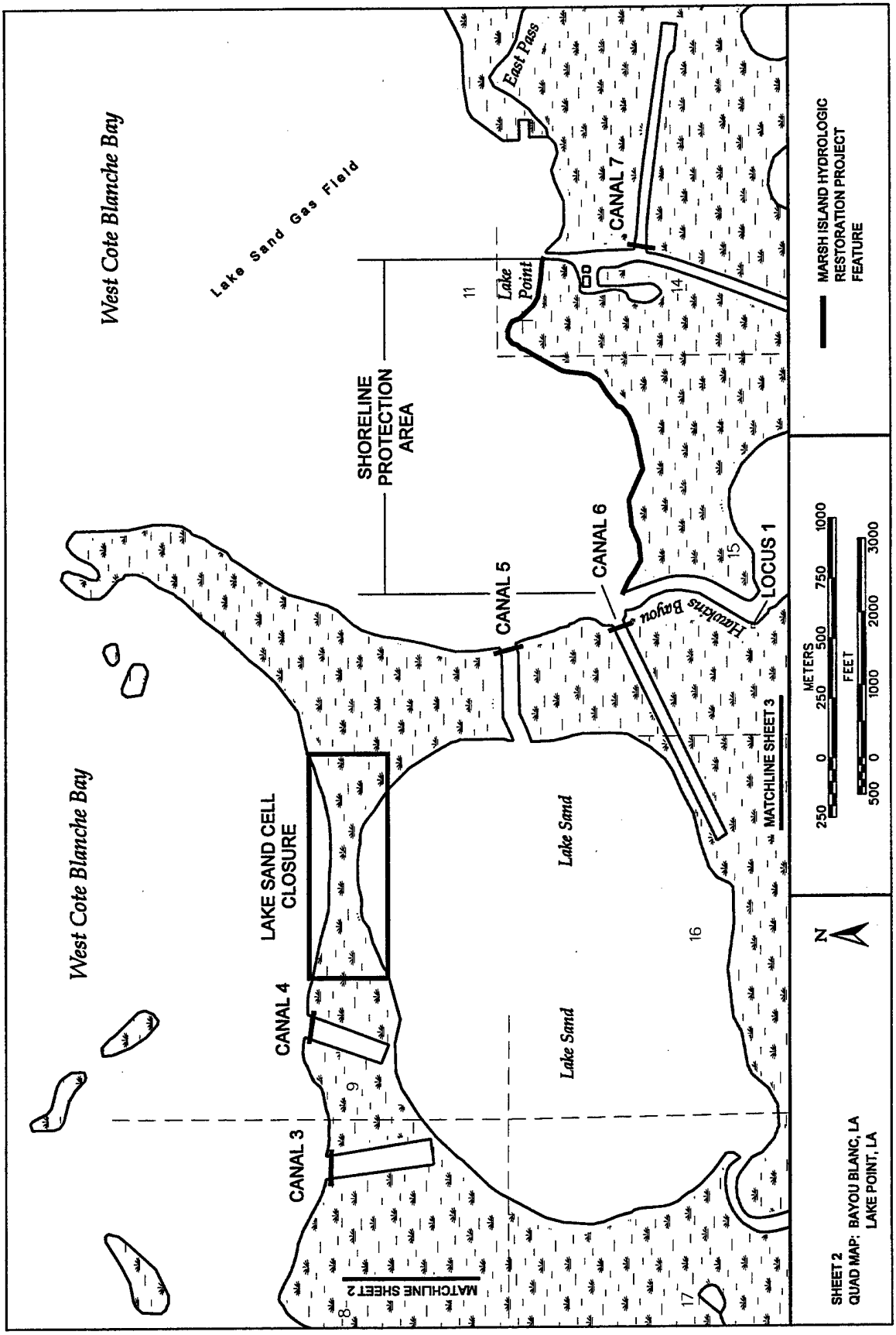


Figure 2. Excerpt from the 1996 digital 7.5 minute series topographic quadrangles, Bayou Blanc and Lake Point, Louisiana, depicting Sheet 2 Canals 3 through 7, the Lake Sand Cell Closure, the Shoreline Protection Area, and Hawkins Bayou project areas on Marsh Island.

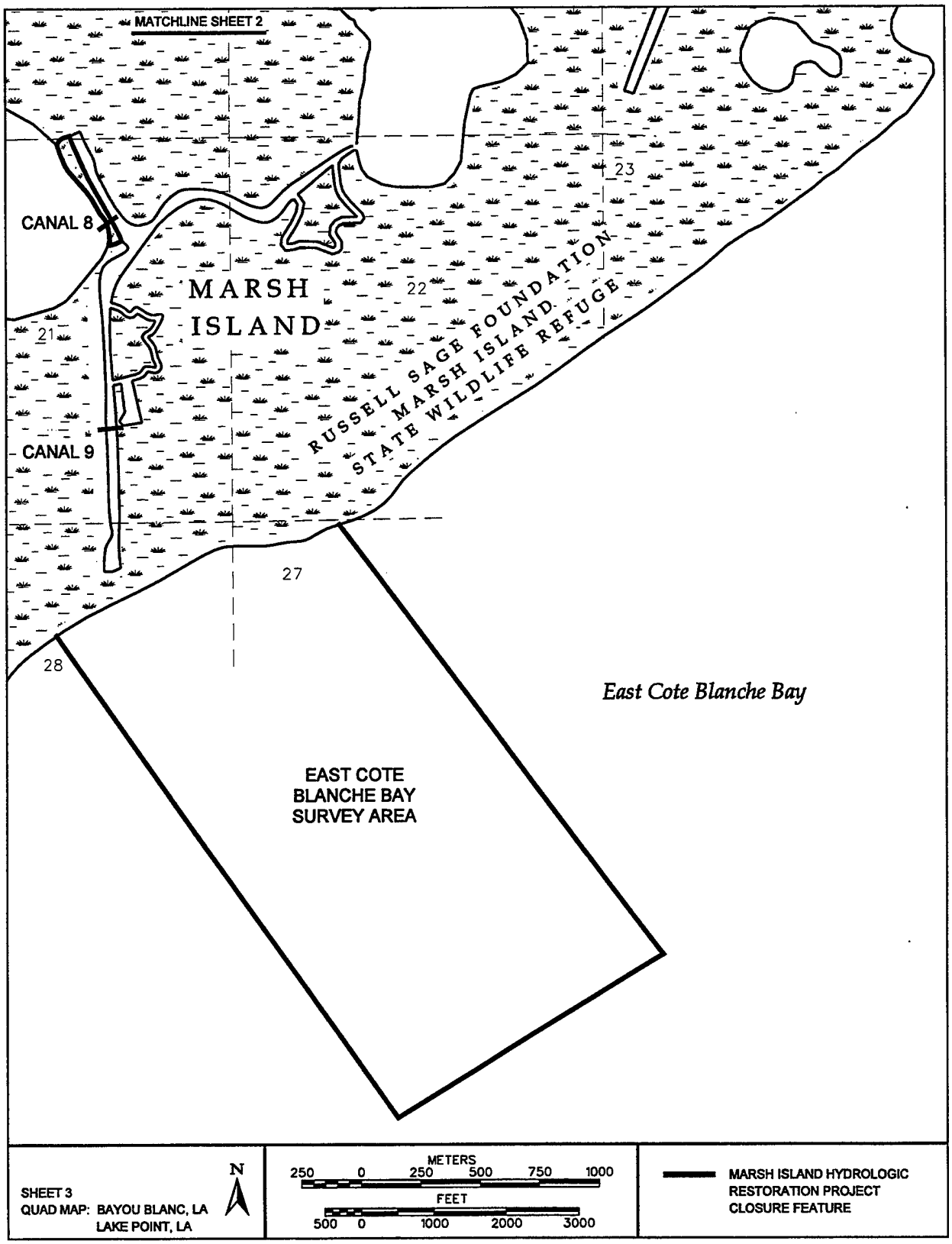


Figure 2. Sheet 3 **Excerpt from the 1996 digital 7.5 minute series topographic quadrangles, Bayou Blanc and Lake Point, Louisiana, depicting Canals 8 and 9 on Marsh Island and the East Cote Blanche Bay survey area in East Cote Blanche Bay.**

69 ac (28 ha) project item measured approximately 305 x 915 m (1,000 x 3,000 ft) in size. Currently, a majority of this area drains into West Cote Blanche Bay via a large breach in the shoreline. Under the proposed alignment plan, this portion of Lake Sand will be enclosed; however, the type and amount of fill to be utilized and the placement gradient of the closure have not yet been specified.

The remaining nine closure items were situated along existing canals located in the northeastern portion of Marsh Island (Figure 2, Sheets 1-3). At least six of these canals (1 - 6) opened into West Cote Blanch Bay and one canal (7) extended between Lake Point and the shoreline at East Cote Blanche Bay. The remaining two canals (8 and 9) were situated within the interior of Marsh Island. Current plans call for the mouths of eight canals (Canals 1- 7 and Canal 9) to be sealed with borrowed dredge material; the remaining canal (Canal 8) will be sealed with a 229 m (750 ft) long closure dike.

The marine and terrestrial aspects of this survey were designed to identify, record, and assess preliminarily all cultural resources located within the limits of each project item. A multistep approach was developed to complete this process. It included reviews of relevant cartographic, archival, and archeological data; marine survey of each underwater project item; visual examination and bankline survey of each terrestrial project item; pedestrian survey, subsurface probing, and shovel testing of the "dry," relatively undisturbed portions of each terrestrial project item; and the delineation, recordation, and preliminary assessment of each newly discovered cultural resources loci or remote sensing anomaly.

This investigation resulted in the identification of four potentially significant marine anomalies (Targets 1, 2, 4, and 11) and one non-site terrestrial cultural resource locus (Locus 1). Based on their spatial and magnetic relations, it appeared that the four magnetic anomaly clusters identified during the instrument survey of the marine portions of the project corridor may represent the remains of previously submerged cultural resources. Thus, the areas corresponding to these locations in East Cote Blanche Bay should be avoided or the targets investigated to identify the source and historical and archeological significance of each anomaly.

The only terrestrial cultural resource (Locus 1) identified during survey was located along the shoreline of Hawkins Bayou (Figure 2, Sheet 2). This locus may represent the remains of a camp erected for hunting, fishing, and/or trapping, or it may be related to operations conducted on Marsh Island by the oil industry. The only visible remains consisted of a series of four dock posts, three of which were visible at low tide only. The dock posts extended out from the shoreline east into Hawkins Bayou. The dock structure probably dates from the early to mid-twentieth century; a structure near this location is illustrated on several historic period maps of the area dating prior to 1951 (Figure 3). Although the physical remains of the dock structure were recorded, this locus did not produce cultural material; consequently, Locus 1 did not warrant archeological site status. No evidence of intact archeological deposits or architectural features was identified at the locus. These results demonstrated that Locus 1 did not possess the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional testing of Locus 1 is recommended.

Project Personnel

Dr. R. Christopher Goodwin served as Director of Research for the project. Mr. William P. Athens, M.A., A.B.D., acted as Principal Investigator for the terrestrial portion of the project and Mr. Christopher Polglase, M.A., A.B.D. served as Principal Investigator for the marine portion of the project. Mr. Athens and Mr. Polglase were assisted by Mr. William Barr, M.A., who directed the terrestrial investigations, and by Mr. J. B. Pelletier, M.A., who directed the marine investigations. Dr. Ralph Draughon, Jr., directed the historical research and was assisted by Ms. Susan Barrett Smith, B.A. The marine fieldwork was conducted by Mr. William B. Barr, M.A., Mr. Adam Kane, B.A., and Mr. David Trubey, B.A., A.B.T. The terrestrial portion of this investigation was executed by Mr. William B. Barr, M.A., Mr. Ryan Crutchfield, M.A., and Mr. Luis Williams, B.A.

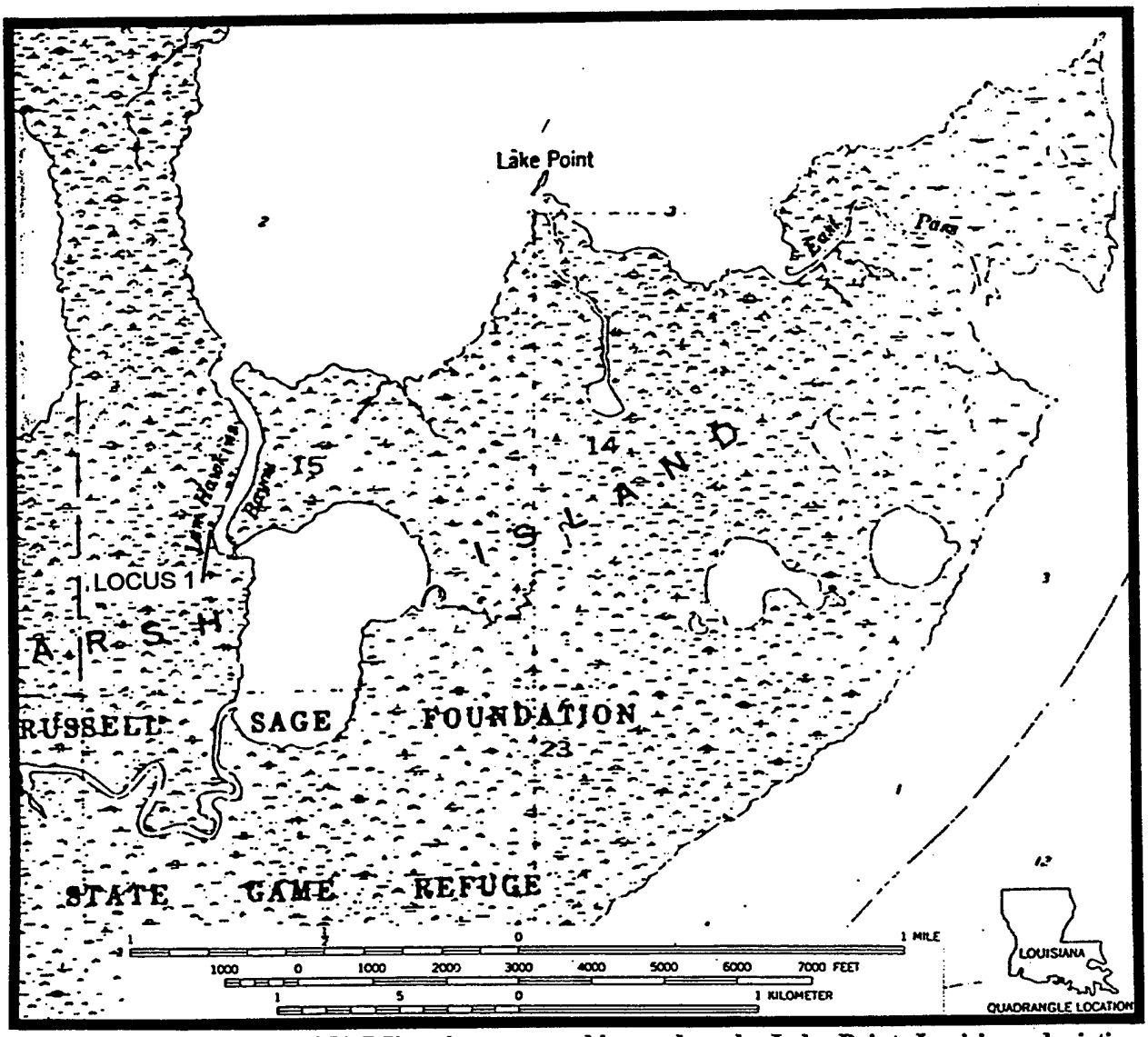


Figure 3. Excerpt from 1951 7.5' series topographic quadrangle, Lake Point, Louisiana depicting historic structures on Hawkins Bayou.

Organization of the Report

The natural setting of the project area is examined in Chapter II and it includes discussions pertaining to the geomorphology, geology, soils, flora, and fauna of the region. A prehistoric overview of the project area and a discussion of the known cultural chronology of the south Louisiana region and the associated lifeways, subsistence practices, and material culture are reviewed in Chapter III. The historical development of the region since European contact is chronicled in Chapter IV. Previous cultural resources investigations conducted within the immediate vicinity of the project area are described in Chapter V. This chapter also contains data on the near shore area situated north of Marsh Island. The research design and field and laboratory methodologies are outlined in Chapter VI. The results of the marine and terrestrial surveys are reviewed in Chapter VII. The management recommendations are presented in Chapter VIII. A summary of the collected remote sensing data is contained in Appendices I - IV. The Scope of Work is included as Appendix V.

CHAPTER II

NATURAL SETTING

Introduction

The Marsh Island Hydrologic Restoration Project areas are located on Marsh Island in southern Iberia Parish in central, coastal Louisiana. Marsh Island is a true island, being bounded on the south by the Gulf of Mexico and on the north by a bay complex consisting of three interconnected bays, i.e., Vermilion, West Cote Blanche, and East Cote Blanche Bays. Marsh Island is one of the largest islands along the northern Gulf Coast; it measures approximately 32 km (20 mi) in an east-west direction (the longest dimension) and it encompasses approximately 303 km^2 (117 mi^2) in area. The entire island is included within the Russell Sage Foundation Wildlife Refuge and Game Preserve. The nearest city of any significant size is Lafayette, Louisiana; it is located approximately 64 km (40 mi) to the north of the island on the Louisiana mainland.

Environmental factors (e.g., geology, geomorphology, flora, fauna, and climate) often influence the distribution and preservation of archeological deposits. The present chapter presents a brief discussion of the geologic and geomorphic processes (both regional and local) that may have effected archeological site location on Marsh Island. It also includes a review of the major landforms and environments, the geologic history, and the evolution of the present landscape. Prior to conducting the investigation, an overview of the natural setting of the proposed project area was developed to aid in the identification of those areas most likely to contain cultural resources. This information was used to predict the possible types, chronologies, and qualities of the archeological deposits that may exist throughout the terrestrial portions of the proposed project areas. These data also were used to correlate various elements of the environmental setting with the prehistoric and historic period human occupation of the coastal region (see Chapter V).

Physiographic and Geologic Setting

Physiographically, Marsh Island lies in the Mississippi River deltaic plain section of the Central Gulf Coast subdivision of the Coastal Plain province of North America (Murray 1961). The Marsh Island landscape is dominated almost entirely by intratidal coastal wetlands with broad expanses of marsh interrupted only by mostly round and shallow ponds, small lakes, and winding tidal channels (bayous). The seaward margin of Marsh Island contains a modest sand/shell beach, an adjacent broad sea rim (washover area), and a number of offshore oyster reefs (Figure 4).

While Marsh Island technically is a part of the Mississippi River deltaic plain, it lacks the characteristic complex pattern of Gulfward trending, branching, and sometimes interconnected distributaries that form the 'skeletal framework' of the plain. Several small deltaic distributaries, however, have been identified in the subsurface of the island to the west of the current project areas and these are discussed later in this chapter. The landscape of Marsh Island essentially is that of a broad interdistributary lowland devoid of prominent natural levee ridges.

To the casual observer Marsh Island is an extremely monotonous and featureless expanse of marsh and shallow water. Indeed, it is very flat, with maximum elevations measuring less than 1.5 m (5 ft) above mean sea level (amsl); there essentially is no relief other than the bank lines or

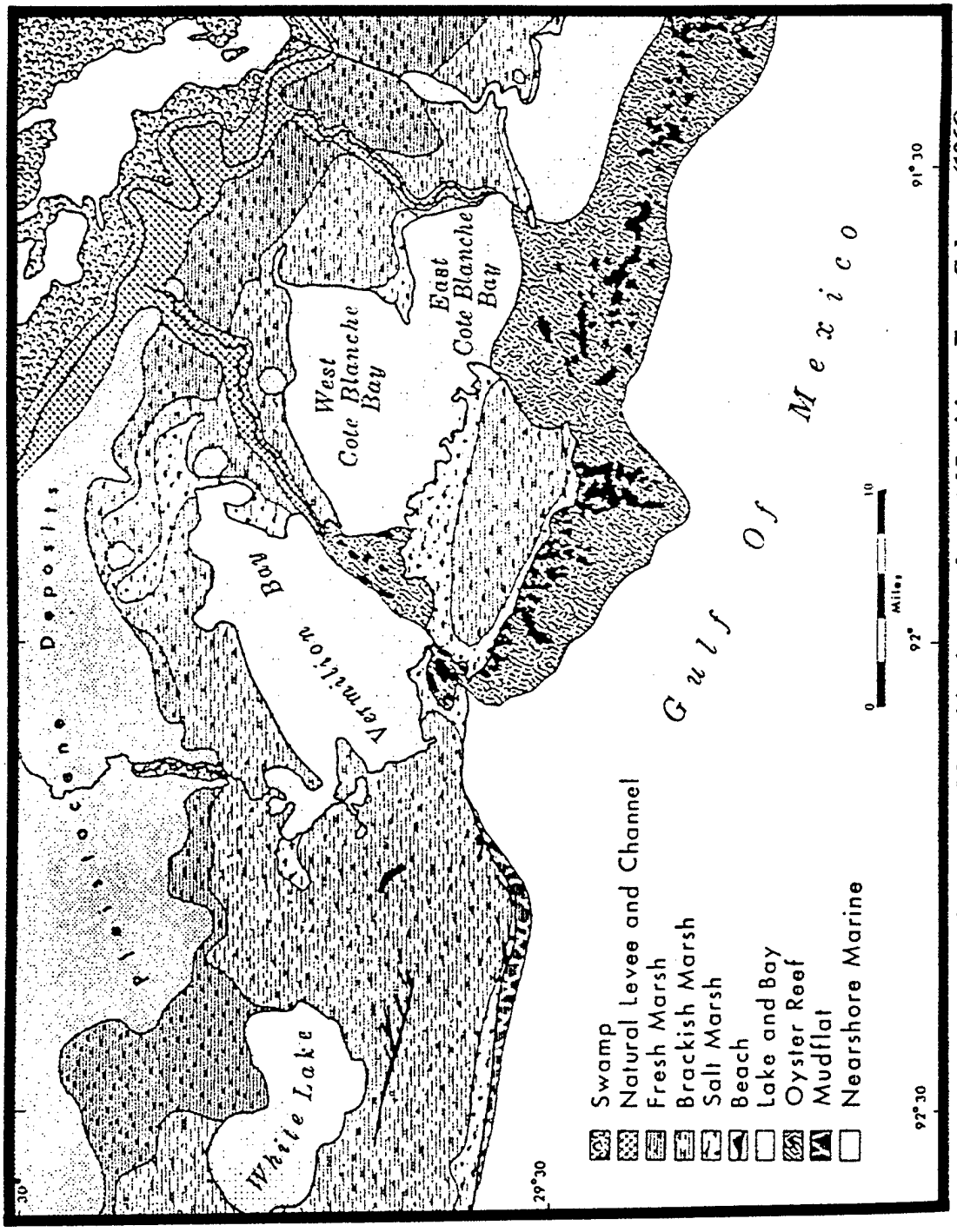


Figure 4. Surficial environments of deposition in central, coastal Louisiana. From Coleman (1966).

shorelines. The highest elevations occur near or at the Gulf shoreline whereas, in the project areas, the elevations do not exceed 0.6 m (2 ft) amsl. The highest elevations within the project areas occur along the very narrow and low natural levees that flank the larger tidal channels (Orton 1959).

Marshes of the eastern portion of Marsh Island are classified as strongly brackish to saline and are inundated daily to a depth of about 15 cm (0.6 in) at normal high tide. The lunar tidal range of waters in the bays is only about 24 cm (9.6 in); however, significant tidal variations occur because of winds and they may range from about 60 cm (24 in) amsl during periods with south winds to an equal amount below the mean during periods with north winds. Tidal changes characteristically cause reversals in the direction of flow in tidal channels like Bayou Blanc which extends across the island just west of the various project items. During hurricanes and strong tropical storms, the entire island may be inundated to a depth of 1 to 2 m (3.2 to 6.5 ft).

The larger ponds and lakes of Marsh Island, such as Lake Sand, have maximum depths of only about 1.2 to 1.5 m (4 to 5 ft). Smaller tidal channels have similar depths, but Bayou Blanc, the largest on the island, measures from 1.8 to 2.7 m (6 to 9 ft) in depth (Orton 1959). In addition to these natural features, there are several artificial canals that connect oil well head locations with nearby streams and lakes. These canals measure up to several hundred meters in length and they probably measure up to 2.7 m (6 to 9 ft) in depth. Several of the project items are directly associated with some of those access canals.

Geologically, the Mississippi River deltaic plain overlies the northern portion of the east-west trending Gulf Basin, a deep structural trough (geosyncline) where the continental crust (Paleozoic basement rocks) has been depressed and where mostly unconsolidated sediments of fluvial, estuarine, and marine origin have accumulated to a thickness of tens of thousands of meters. The northern flank of the Gulf Basin is characterized not only by prevailing subsidence but also by east-west trending zones of active growth faults and the diapiric intrusion of salt to form piercement-type salt domes (Murray 1961).

More specifically, the deltaic plain is the surface manifestation of a relatively thin, seaward thickening prism of Holocene deltaic and shallow marine deposits that overlies Pleistocene deposits of similar origin and still older ones with depth (Kolb and VanLopik 1958). In the project area, the Holocene prism or veneer varies from about 13.7 to 17.7 m (45 to 58 ft) in thickness (Orton 1959), and it consists of a highly variable mixture of peats, clays, silts, and fine sands (May et al. 1984). These sediments directly overlie an erosional unconformity and a paleosol that formed across the top of the late Pleistocene coastal plain formation known as the Prairie complex (Autin et al. 1991). This unconformity formed during the last major glacial stage when sea levels were 50 to 135 m (164 to 443 ft) lower than at present and the surface was exposed to several thousand years of subaerial erosion (Saucier 1994).

In general, this prism of Holocene deltaic deposits represents several distinctive onlapping sedimentary cycles initiated by upstream diversions of river flow, each cycle being the correlative of a discrete delta complex. Each cycle involves sediments laid down in multiple environments of deposition ranging from fresh water to saline in the dynamic zone of interaction where the river emptied into the Gulf. As illustrated in Figure 5, the cumulative result of multiple cycles has been the net buildup and seaward buildout of the delta plain. Each delta complex in turn involves a series of delta lobes, a lobe being defined as that portion of a complex that formed during a relatively short period of time and that can be attributed to a single or discrete set of delta distributaries (Saucier 1994). Because of the prevailing influence of subsidence and sea level rise, each lobe typically experiences a constructional or progradational phase in which fluvial processes are dominant, and a subsequent destructional or transgressive phase in which marine processes become progressively more prominent (Figure 6). The particular environments that are represented in the project area are discussed in the following section of this report.

The Marsh Island area has been affected by three delta cycles and the deposits have been assigned to the Maringouin complex and two lobes of the Teche complex (Figure 7) according to a widely accepted chronostratigraphic model of delta development (Frazier 1967). These are discussed more fully later in this chapter.

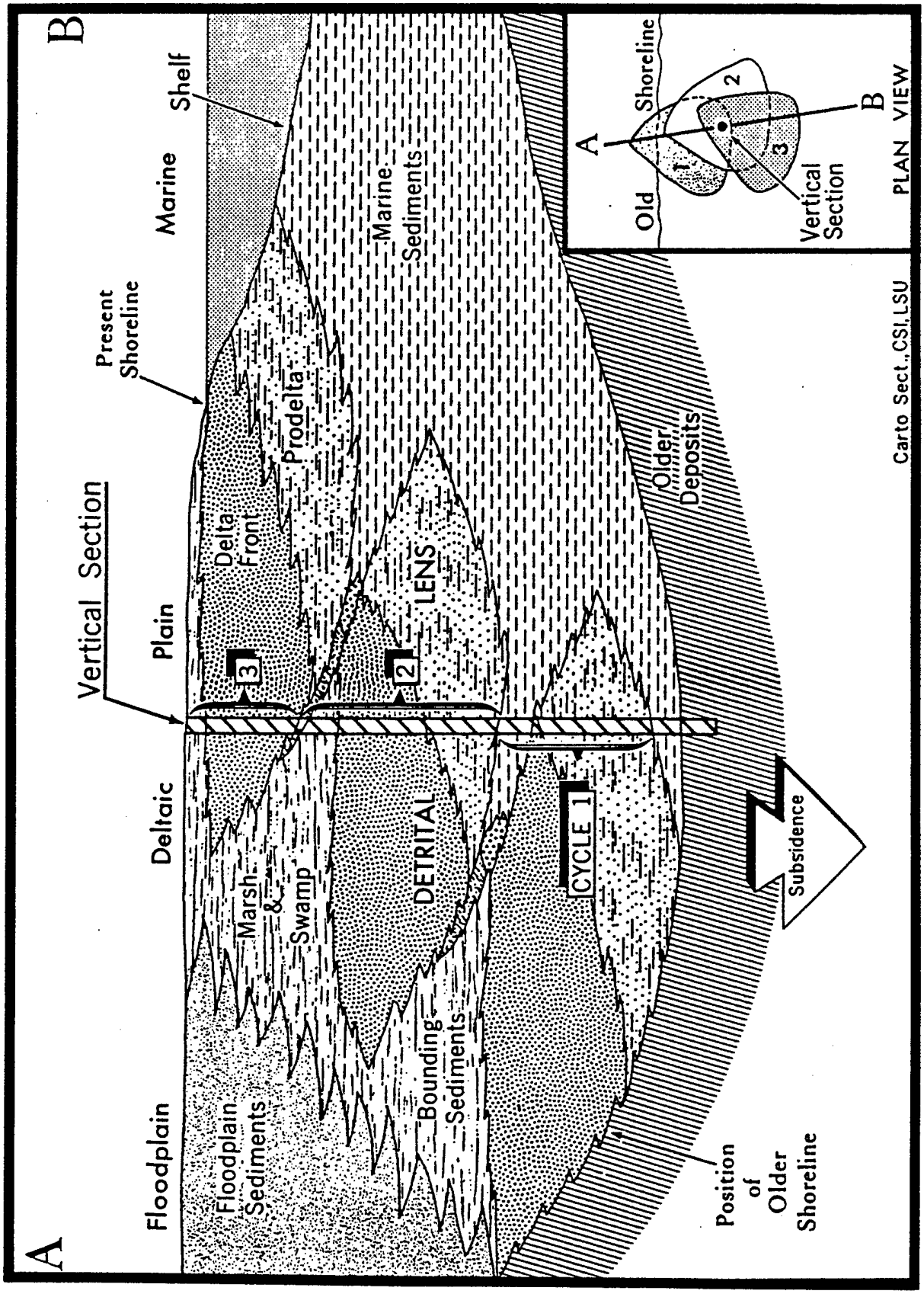


Figure 5. **Hypothetical sedimentary sequence resulting from several overlapping deltaic cycles showing environments of deposition. From Coleman and Gagliano (1964).**

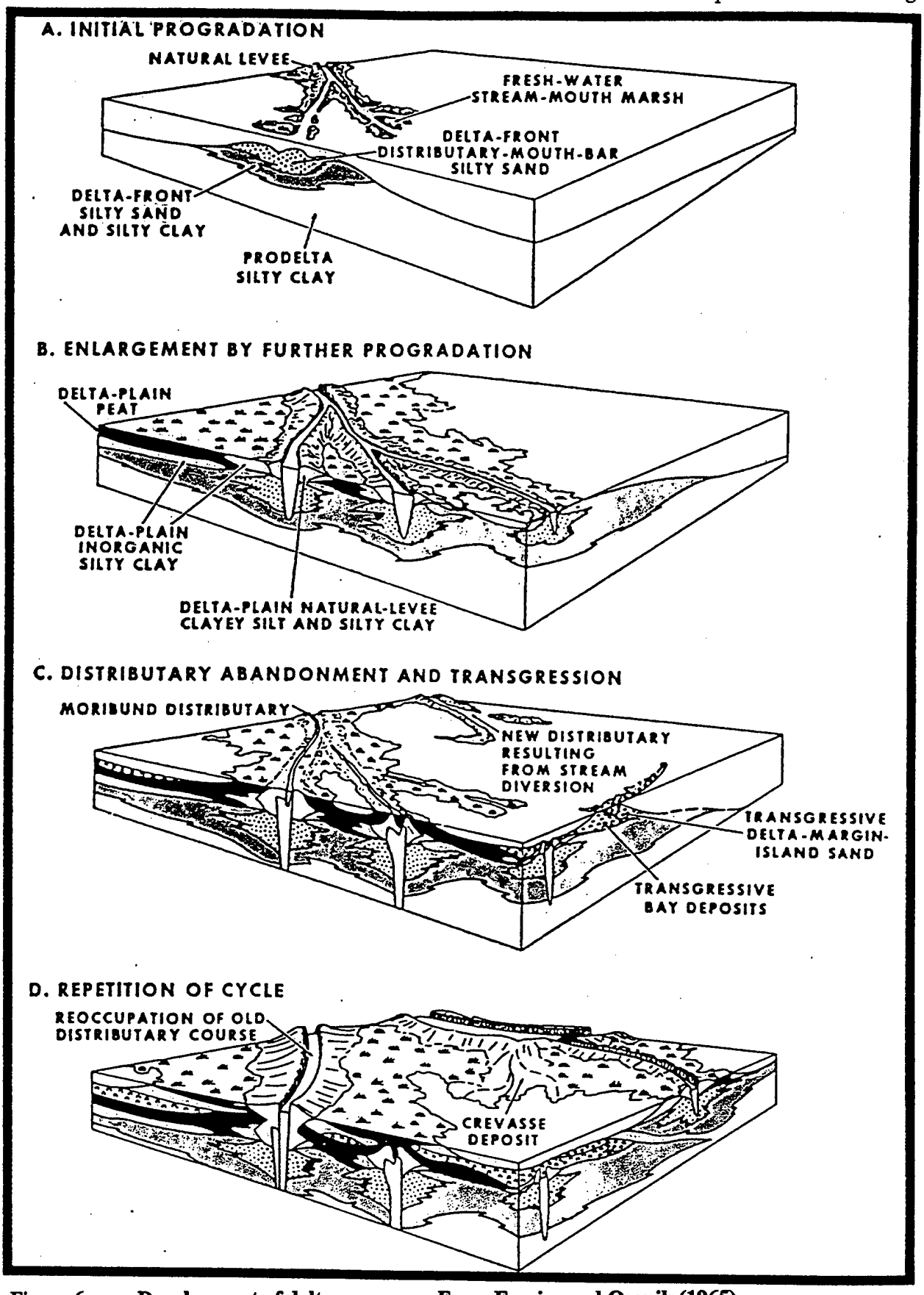


Figure 6. Development of delta sequences. From Frazier and Osanik (1965).

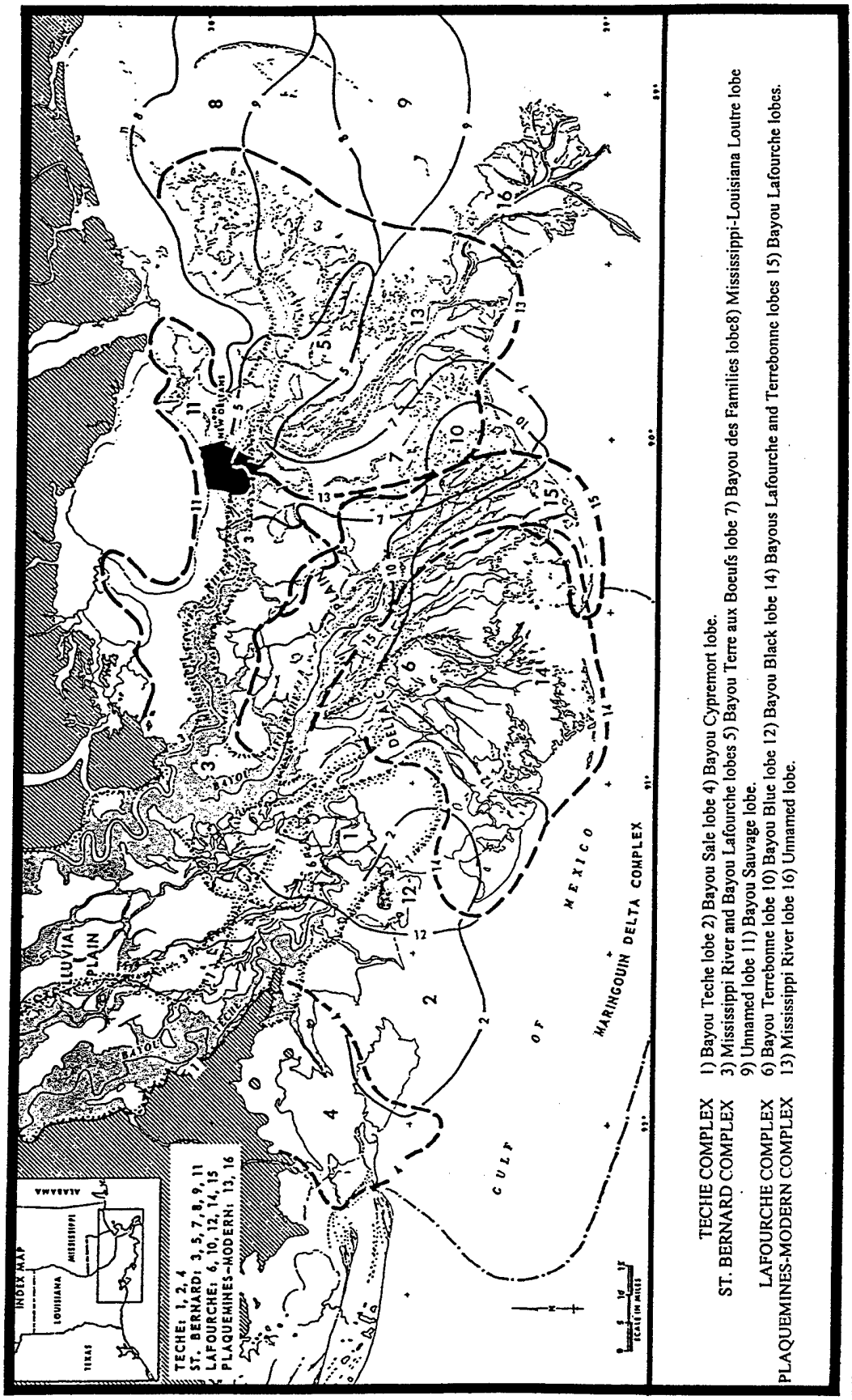


Figure 7. Delta lobes formed by the Mississippi River in the past 6,000 years. From Frazier (1967).

Regional Geologic Processes

To understand the delta cycles, the sedimentary architecture of complexes and lobes, and the nature and distribution of depositional environments, it is necessary to recognize the prevailing influence of subsidence and sea level rise, especially during the waning of the last major continental glaciation and the resulting Holocene sea level transgression. The five basic factors involved in subsidence are true or actual sea level rise, sinking of the basement rocks due to crustal processes, consolidation of the thick sedimentary sequence in the Gulf Basin, local consolidation of nearsurface deposits due to desiccation and compaction, and tectonic activity. The relative roles of each of these factors are discussed at length by Kolb and VanLopik (1958) and they are not repeated herein; instead attention is focused on the net result of the processes and the response of the deposits and landforms in the project areas.

Exactly when post-glacial sea level reached its approximate present level is a major problem that has been studied and debated for many decades (Saucier 1994). Estimates have varied widely as a function of the area studied, the methods used, and the precision of the evidence. Compounding the problem is the need to separate true sea level rise from the other components of subsidence--indeed a formidable task along the Louisiana coast.

Perhaps the most definitive study as far as Marsh Island is concerned is that of Coleman (1966) who obtained and statistically analyzed 13 radiocarbon dates on buried peat deposits which were originally laid down within the tidal zone on or near the island. It appeared that sea level reached its approximate present level between about 3,000 and 4,200 years ago. Between that time and the present, the regional subsidence rate measured about 7.3 cm (2.88 in) per century. Between that time and about 7,000 years ago, Coleman estimated the rate of true (eustatic) sea level rise at 13.4 cm (5.28 in) per century. Combined with the other components of subsidence, a total rate of about 20.7 cm (8.2 in) per century was calculated.

More recent studies in the Gulf Coastal area (Penland et al. 1991) and elsewhere in the world have found evidence indicating that the *rate* of sea level rise between about 3,000 and 7,000 years ago was not steady. Rather, there were periods of at least several centuries when sea level was essentially constant, separated by periods of comparable length during which the rate of rise may have been greater than 200 cm (68 in) per century. As will be discussed later, the alternating periods were probably integral factors in the deltaic cycles of progradation and transgression. Thus, the evolution of Marsh Island and its prehistoric occupation was directly affected by subsidence and sea level rise.

Landforms and Depositional Environments

Following a tradition in large-scale geologic mapping established several decades ago in both the Mississippi alluvial valley and deltaic plain (e.g., Kolb et al. 1968; Kolb and VanLopik 1958), alluvial and deltaic deposits have been classified according to the inferred environments in which they were laid down. The classification applies to both surficial environments (or landforms), such as natural levees and intratidal wetlands, and buried ones such as interdistributaries and baysounds.

Holocene deposits in the project area (both surface and subsurface) involve only four basic environments. Since the distribution of some is apparent (e.g., lakes and bays) and the limits of others are indistinct (e.g., natural levees), no attempt has been made to map them either in plan or profile since this would be meaningless. The following discussions provide information on the origin and characteristics of these features, and it includes an examination of the associated soils and vegetation. The stratigraphy and chronology of the Holocene deposits are discussed later in the chapter.

Natural Levees

Natural levees are low, broad, linear alluvial ridges that flank both sides of a stream channel. They are formed by the deposition of sediment during a flood stage event. As floodwaters top the channel banks, the velocity is reduced, which causes the deposition of the coarser suspended sediment near the crest of the levee (Coleman 1966). Thus, levee ridges are lower in elevation away from the stream channel.

Other factors being equal, the size of a natural levee is directly proportional to the size (discharge and sediment load) of the parent stream. As a result, levees measuring up to several kilo-

meters in width and several meters in height flank the Mississippi River trunk channels and these features are proportionately lower and narrower along the Mississippi River distributaries.

There are no distributaries with visible natural levees on Marsh Island, but conspicuous natural levee ridges are present on distributaries within several kilometers of the island. The southwestward trending Bayou Cypremort distributary lies north of the island and just northwest of West Cote Blanche Bay, while the southward trending Bayou Salé distributary lies east of the island and east of East Cote Blanche Bay (Figure 4). The natural levees of both of these (which will be discussed later), are conspicuous because their mixed, deciduous hardwood forest cover stands in sharp contrast to the surrounding marsh.

The only true natural levees on Marsh Island proper are those that flank the larger tidal channels like Bayou Blanc. Levees are present along these streams because they carry small loads of suspended sediment and they occasionally top their banks during times of unusually high tides. While the levees measure less than 100 m (328 ft) in width and less than 1 m (3.28 ft) in height, they are discernible by relatively firm, oxidized, clayey soils and low shrub growth consisting mostly of marsh elder (*Iva frutescens* and *Baccharis halimifolia*) and roseau cane (*Phragmites communis*). Soil surveys for the area have not been sufficiently detailed to identify the specific soil types associated with the levees.

Intratidal Marshes

All of the marshes of Marsh Island are strongly brackish to saline in character. Beneath a leaf litter and root mat zone there is a meter-or-so-thick zone of watery, gray, organic ooze or very soft clay that grades downward into mostly soft gray clays with peat lenses. The landscape of the project area is overwhelmingly that of marsh grass tracts interspersed with ponds, small lakes, and tidal channels.

Marsh soils of Marsh Island have been mapped by Clark and White (1978) and they recognized the saline soils of the Lafitte association throughout the northern parts of the project areas. These soils are described as very poorly drained, organic soils of frequently flooded, soft marshes. In the southern parts of the project areas, they identified the Scatlake association which are the very poorly drained, clayey soils of frequently flooded soft marshes. Although they drew lines separating the soil types, it is apparent that they are highly gradational in extent. To say some project items are included in one type and some in the other would be largely arbitrary and misleading. Certainly from geological, archeological, and engineering viewpoints, the differences are not particularly meaningful.

The ponds and small lakes of the marshes are more significant since their distribution and their abundance affect the overall ecology, productivity, and hydrology of the wetland tracts. The lacustrine features probably originated in the deeper marsh areas well away from any natural levees. Various ideas have been advanced as to their causal mechanism, including severe marsh burns and goose eatouts (Orton 1959). Irrespective of their origin, it is clear that their shape and enlargement are due to wave action and current erosion during tropical storms and frontal passages. It also is clear that as lakes and ponds enlarge and deepen, the rate of shoreline erosion increases.

Erosion along the Gulf shoreline of Marsh Island has been significantly less than one might expect for an area subjected to wave and current action by such a large water body. The primary reasons for this are the presence of extensive oyster (*Crassostrea virginica*) reefs offshore in the Gulf and a well-developed sea rim with firm and silty/sandy deposits. Erosion of the shores of the ponds and lakes as well as the bays, however, does suggest a significant geomorphic process. In an area with only a very small amount of inorganic sediment, the organic-rich deposits found along these marshes cannot withstand frequent wave attack without a buffering beach deposit. In a detailed, comparative aerial photo mapping effort, May and Britsch (1987) noted that very few new ponds originated in this area of study; however, the shores of Lake Sand eroded by about 100 m (328) between 1937 and 1983. This represents an annual rate of slightly over 2 m (6.5 ft). In contrast, Orton (1959) estimates erosion along the northeastern margin of Marsh Island (East and West Cote Blanche Bay shorelines) to be about 3.6 m (12 ft) per year. In their more precise study, May and Britsch measured shoreline retreat of 152 to 457 m (500 to 1,500 ft) during the 1937 -

1983 period. This amounts to about 3.3 to 9.9 m (10.8 to 32.5 ft) per year. Unfortunately, there are no earlier surveys of sufficient accuracy to determine if the rates are increasing or decreasing over time, but numerous other studies along the Gulf Coast would suggest that such rates have been increasing.

Beaches

The only significant beaches on Marsh Island occur along the Gulf shoreline. Elsewhere, including in the project areas, only low (less than 1 m [3.28 ft]), narrow (a few meters), and discontinuous beaches composed almost entirely of shell and shell fragments comprise the marsh shorelines. According to Orton (1959), the predominant shell types are *Rangia cuneata* and *Polymesoda caroliniana*. The beaches represent the remains of dead mollusks that have washed ashore from adjacent bays. These beaches are largely inconsequential as far as the foci of this report are concerned.

Nearshore Marine Environment

The nearshore marine environment includes areas of the Gulf offshore from Marsh Island, the bay/sound environment of East and West Cote Blanche Bays, and Holocene deposits buried in the subsurface (Figure 4). Deposits of the nearshore marine environment include materials on water bottoms that may be there because of both erosion and deposition, but primarily the latter. In the project area, they include mostly shelly sands, silts, and silty clays originating from the erosion and winnowing of deltaic deposits by waves and currents. They also include, however, the relatively erosion-resistant buried natural levee extensions of Bayous Cypremort and Salé that have been planed off by subaqueous processes. The firm clay bay bottoms have been favored locations for oyster colonization and reef formation. No situation of this type, however, occurs in the project area.

In the Marsh Island area, the nearshore marine environment also includes extensive areas of mostly extinct oyster reefs. As their distribution has been mapped (Figure 4), the project areas lie within a zone of possible reef occurrence, but where none of any significant size have actually been detected. Some small deposits of either dead or living oyster shell may occur in the offshore access and borrow areas.

In the subsurface, the erosional surface formed on Pleistocene deposits sometimes is overlain by a thin layer of deposits laid down in a nearshore marine environment. This represents materials reworked from the Pleistocene deposits and/or moved shoreward during the onlapping of the erosional surface during the post-glacial rise of sea level (the Holocene transgression). Borings have been insufficient in number and depth to definitively establish the presence of nearshore marine deposits in the project area. However, the marine sand mapped by Orton (1959), at a depth of 9.0 to 9.8 m (29.5 to 32.0 ft), probably represents a marine invasion of the area, but not necessarily the Holocene transgression (Figure 8).

Pleistocene deposits underlying the Holocene fluvial/marine sequence described above are distinctly different in terms of consistency and color. While the original environments of deposition have not been determined, the deposits were subjected to tens of thousands of years of subaerial weathering prior to burial. They consist of very stiff to hard, mottled gray, brown, yellow, and green oxidized clays or silty clays. Calcareous concretions and shell fragments often are present. Deposits with these characteristics extend to depths of tens of meters below the erosion surface. As indicated above, these are believed to occur at a depth of 13.7 to 17.7 m (45 to 58 ft) beneath the surface, dipping gently to the south or southeast (May et al. 1984; Orton 1959).

Shallow Stratigraphy and Landform Evolution

Large-scale geologic mapping and a cross-section of the area prepared by May et al. (1984), demonstrate that the Holocene sequence at the eastern end of Marsh Island (near but west of the project areas) consists of about 6 m (20 ft) of marsh deposits that overlie about 9.1 to 12.2 m (30 to 40 ft) of undifferentiated interdistributary deposits. This generalized subsurface section is insufficient to reconstruct the chronology of deposition, relate the deposits to specific deltaic cycles, and determine the specific environments of deposition. Fortunately, Coleman (1966) has provided a much more detailed and diagnostic subsurface description of the area along with a chronology derived from radiocarbon dates.

The rising post-glacial sea level transgressed

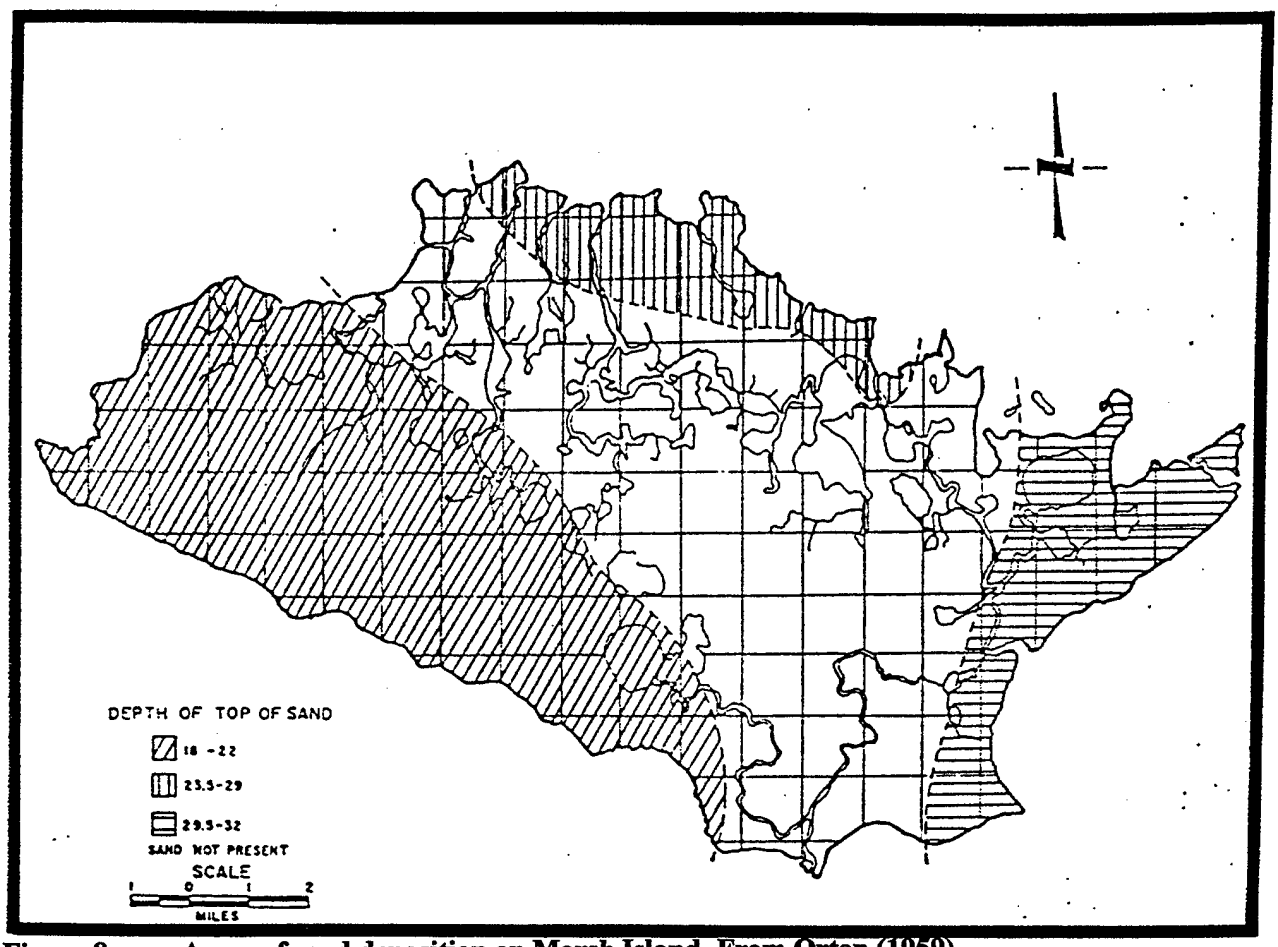


Figure 8. Areas of sand deposition on Marsh Island. From Orton (1959).

across the Pleistocene surface in the project area about 8000 to 9000 BP. Prior to that time, the surface consisted of an exposed Coastal Plain landscape that probably was mostly forested. As sea level rose, the Gulf shoreline moved inland, drowning forests and replacing them with a shallow, nearshore marine environment. Evidence from the Gulf Coast area indicates that considerable erosion accompanied this event except in some minor stream entrenchments. During this interval, the Mississippi River began forming the first post-glacial deltaic complex well offshore from central Louisiana, the Outer Shoal complex (Penland et al. 1988). This now-destroyed complex, marked only by shoals and detected by marine seismic surveys and coring, was the first to form when the rate of sea level rose slowly and sufficiently to allow deltaic plain formation. The location of the trunk course for this complex is not known.

The interval between about 8200 and 7300 BP is believed to have been a time of rapid sea level rise. It was during this time that the Outer Shoal complex was abandoned and a transgressive phase began (Penland et al. 1991). No delta complex representing this interval is known to exist, and likely none have formed.

Starting about 7,300 years ago and continuing for about 1,300 years (until approximately 6000 BP), the Mississippi River flowed in a trunk course situated along the western side of its valley (Figure 7), and it began constructing the widely recognized Maringouin complex (Frazier 1967; Saucier 1994). No distributaries of this largely-offshore complex have been recognized and they likely were destroyed during a subsequent rise in sea level. Penland et al. (1991) believe that sea level was largely stationary during this interval at a level about 6 m (19.7 ft) below present.

In the general Marsh Island vicinity, Coleman (1966) identified two blanket peats between depths of about 9.7 and 12.5 m (31.7 and 41.0 ft) which yielded radiocarbon dates ranging from 6150 ± 145 to 7240 ± 160 years BP. That the depths of the blanket peats are greater than the estimated sea level at the time can easily be reconciled by factoring in regional subsidence. Blanket peats are described by Coleman (1966) as representing fresh, brackish, and saline marsh environments. They are 0.6 to 1.5 m (2 to 5 ft) thick and regionally extensive rather than being related to a single distributary. In the project vicinity, they are overlain, separated, and underlain by deltaic deposits of the Maringouin complex. Thus, they represent the first delta complex to affect the project area and to convert a shallow marine to a terrestrial landscape, albeit a paludal one.

Although Penland et al. (1991) believe that sea level remained relatively stationary, many workers (as discussed in Saucier 1994) agree that the Maringouin complex had ceased growing and was well into a transgressive phase by about 6,000 years ago. The seaward margin of the complex experienced erosion and subsidence with lakes and bays expanding at the expense of vegetated marsh. Near the head of the complex, however, sedimentation continued and it eventually led to formation of the next complex, the Teche (Figure 7). Distributaries of the Teche complex advanced Gulfward, progressively overriding and burying surviving remnants of the Maringouin complex.

The Bayou Cypremort and Bayou Salé distributaries of the Teche complex directly impacted the Marsh Island area and they probably initiated the intradistributary conditions that have continued to the present. The stratigraphic sequence identified by Coleman (1966) as belonging to the Teche complex is an alternating series of deltaic sediments and blanket peats. Radiocarbon dates on the sequence allow the following chronological reconstruction.

A blanket peat at a depth of 4.8 to 6.6 m (15.8 to 21.8 ft), dated at about 4,700 years ago, marks a marsh surface over which natural levees of the Bayou Salé distributary advanced Gulfward. This was followed a short while later by development of the Bayou Cypremort distributary. Subsurface investigations by both Coleman (1966) and Orton (1959) indicate that branches of the Bayou Cypremort distributary extended southward across central and western Marsh Island and into the present Gulf area (Figure 9). Evidence for this consists of tight gray natural levee deposits encountered in borings at a depth of 1.5 to 1.8 m (5 to 6 ft). A shallower blanket peat at a depth of 2.6 to 5.0 m (8.6 to 16.5 ft) and with an average date of 4,000 years ago formed while both distributaries were active. Borings indicate the peat layer extends across almost all of Marsh Island, including the project area. This layer represents a lull in deltaic sedimentation

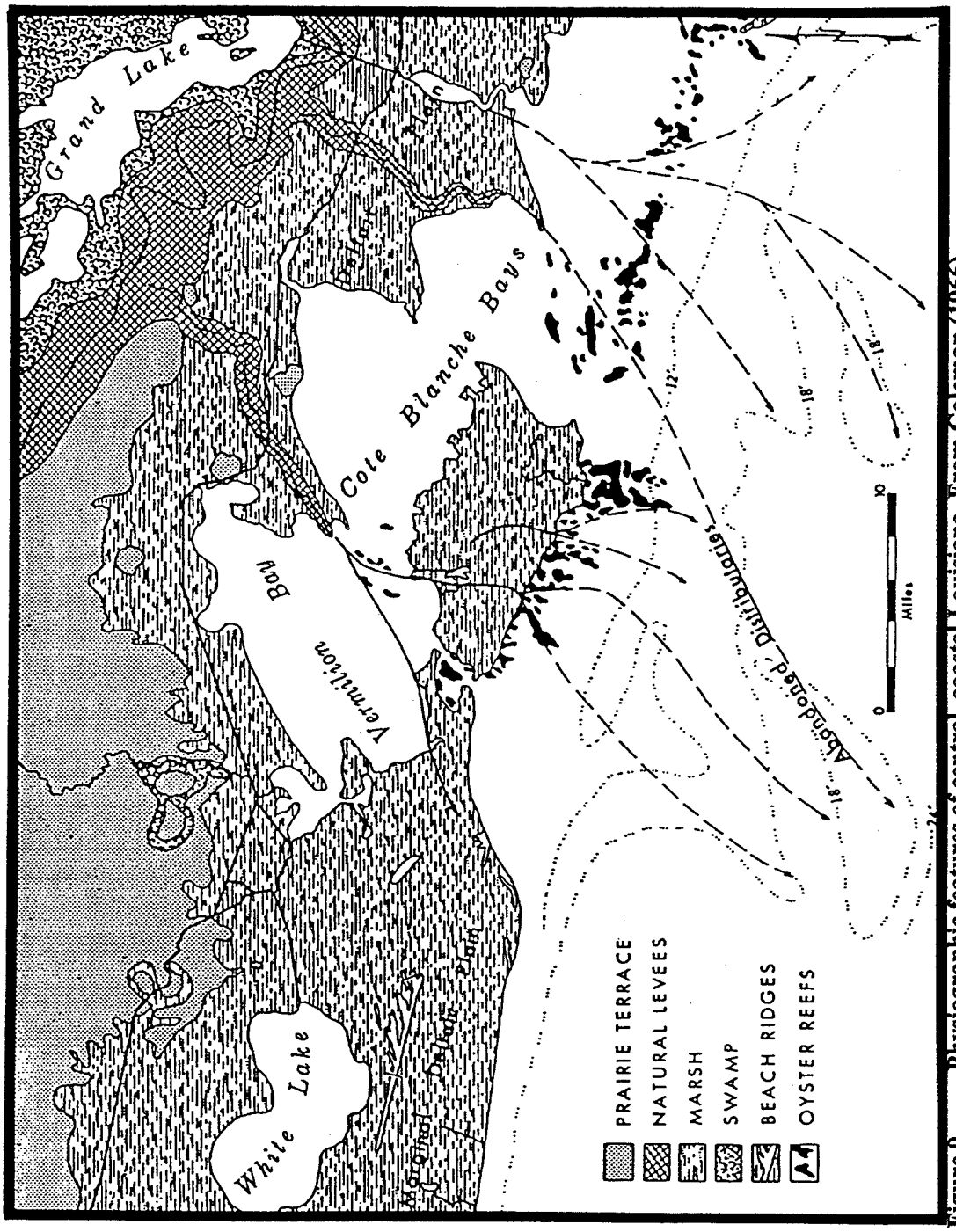


Figure 9. Physiographic features of central, coastal Louisiana. From Coleman (1966).

during which time an interdistributary marsh probably formed when sea level was at or very close to its present level. Unquestionably, Marsh Island was much larger than at present and Vermilion, West Cote Blanche, and East Cote Blanche Bays were not connected as they are today.

Some Mississippi River discharge may have continued through the Bayou Cypremort and Bayou Salé distributaries until perhaps 3000 BP, but it was probably insufficient to cause further growth of the delta lobes. Beginning as early as about 4800 BP, the Mississippi River trunk channel shifted to the eastern side of the alluvial valley (Saucier 1994) and most of the river discharge was directed into the St. Bernard deltaic complex, an area far removed from the Marsh Island vicinity. Hence, this was probably the causal mechanism that led to the development of the 4,000-year-old blanket peat. Clastic sedimentation declined and organic sedimentation became dominant.

With the Mississippi River discharge entering the Gulf at the eastern side of the deltaic plain, the Marsh Island area was too far away to receive suspended sediment that was being carried westward by prevailing coastal currents. Mudflats, and hence new marsh, were not created and there was very little suspended clastic sediment to nourish the marshes during high tides. Thus, between about 4000 BP and at least 3500 BP, the interdistributary regime was dominated by subsidence rather than sedimentation.

Between about 3500 and 2000 BP, the locus of active deltaic sedimentation shifted slightly farther westward as an early phase of the Lafourche complex began forming (Frazier 1967; Saucier 1994; Figure 7). Even though there is evidence that mudflats formed in the Chenier Plain area of southwestern Louisiana, there is no evidence of progradation in the Marsh Island area. The process of shoreline erosion may have been slowed, but it apparently was not reversed. Eventually even mudflat formation ended, and another blanket peat formed in the greater Marsh Island area about 1,600 years ago at a depth of 0.9 to 1.8 m (3 to 6 ft) (Coleman 1966).

The next wave of clastic sedimentation to affect the general area occurred between about 1200 BP and 600 BP when the Mississippi River rapidly built the late phase of the Lafourche complex in central, coastal Louisiana (Figure 7, lobe No. 15). Large quantities of clastic sediments carried westward by longshore currents resulted in the creation of the vast marsh area west of Vermilion Bay and south of White Lake (Figure 9). There is no evidence to indicate the nature of geomorphological events in the Marsh Island area during this interval, and while it is surmised that wetland deterioration slowed or ceased, the process was not reversed.

The final sedimentation event occurred during historic times as a result of the initial development, over the last several decades, of the Atchafalaya delta lobe (just east of the edge of Figure 9). While some suspended sediments have been drifting westward into the Chenier Plain area and forming mudflats, the bulk of this instead has been deposited in a rapidly-growing subaqueous and subaerial delta in Atchafalaya Bay. Detailed studies (Van Heerden et al. 1991) have shown that marsh areas around the northern part of the shallowing bay continued to erode under wave attack until the newly developing delta actually became emergent. Such was probably the case in the Marsh Island area after 4000 BP--East and West Cote Blanche Bays may have undergone episodes of shallowing, but shoreline erosion and marsh deterioration (i.e., formation of new ponds and lakes and enlargement of existing ones) continued in the project area.

Soils

A total of 12 general soil series have been mapped in Iberia Parish (Clark and White 1978). Over 90 percent of these soils are categorized as poorly drained, somewhat poorly drained, and very poorly drained. Of the 12 general unit descriptions noted, three are found on Marsh Island: the Placedo Association, the Scatlake Association, and the Lafitte Association. The Placedo Association contains the very poorly drained clayey soils found in firm marshes. The Scatlake Association contains very poorly drained clayey soils and it is found in soft marshes. The Lafitte Association contains very poorly drained organic soils and it too is common in the soft marshes. Although historic populations settled in these areas, they were generally not the preferred environments of the prehistoric populations. The project areas are characterized by two soil series, the Lafitte Series and Scatlake Series.

Soils develop as a function of a number of variables, including climate, vegetation, parent material, time, and organisms (Gerrard 1981). Once archeological deposits are buried within the soil, they are subject to a number of diagenic processes. Different classes of artifacts may be preferentially protected, or unaffected by these processes, while others may degenerate rapidly. Cyclical wetting/drying, freezing/thawing, and compression can accelerate the decay processes for animal bones, shells, ceramics, and plant remains both chemically and mechanically (Thorne 1989). Ceramics are largely unaffected by the pH of the soil, where animal bones and shells decay more quickly in acidic soils, such as those found in the project area. Charred plant remains, however, have their preservation potential enhanced by acidic soils (Thorne 1989).

As mentioned above, three soil associations (Lafitte, Placedo, and Scatlake) have been identified on Marsh Island by the United States Department of Agriculture, Soil Conservation Service (Clark and White 1978). Only two of these (Lafitte and Scatlake), however, have been recorded on the northeastern part of the island, i.e., within the terrestrial portion of the project area (Table 1). A total of six of the canal closures (Canal Closures 1-6), the Shoreline Protection item at Hawkins Bayou, and the Lake Sand Closure item occupy areas that are characterized by soils of the Lafitte association. The three remaining project items (Canal Closures 7-9) occupy soils of the Scatlake association.

The Lafitte Association comprises approximately 20 percent of Iberia Parish. The association consists of approximately 86 percent Lafitte soils with the remaining 14 percent comprised of Andry, Delcomb, Iberia, and Maurepas soils (Clark and White 1978:10). The saline Lafitte soils are very poorly drained and generally found at lower elevations; approximately 10 percent of the parishwide total is found on Marsh Island. The typical soil profile contains a surface layer of dark-brown organic material that is underlain by 2.95 m (9.7 ft) of very dark grayish-brown, dark reddish-brown, very dark gray, and black, almost

Table 1. Soil Types Located in the Proposed Marsh Island Project Area.

SOIL TYPE	TOP ELEVATION (cm)	BOTTOM ELEVATION (cm)	DESCRIPTION
1. Lafitte Series	0	41	10YR 4/3 dark brown hemic material with live roots and herbaceous fiber; slightly acidic.
	41	135	10YR 3/2 very dark grayish brown and 10YR 2/2 dark brown sapric material mottled with a 10YR 5/3 herbaceous fiber; neutral to acidic.
	135	160	10YR 5/2 black sapric material that is nearly 50% fiber and 25% mineral content; neutral.
	160	229	10YR 3/1 very dark gray sapric material that is 30% fiber and 50% mineral content; neutral.
	229	335	5YR 3/2 dark reddish brown sapric material that is about 20% woody fiber and 30% mineral content; neutral.
	335	351	5Y 4/1 dark gray clay; massive, firm, and compact.
2. Scatlake Series	0	15	10YR 3/1 very dark gray mucky peat that contains 75% fiber including live roots, mottled with 5Y 3/1 very dark gray semi-fluid mucky clay; moderately alkaline.
	15	25	5Y 4/1 dark gray semi-fluid clay; moderately alkaline.
	25	30	N 2/0 black muck and 5Y 5/1 gray mucky clay; moderately alkaline.
	30	38	5/1 gray mucky clay; moderately alkaline.
	38	152	5GY 6/1 greenish gray semi-fluid clay; moderately alkaline.

1. Lafitte soils were mapped at eight project items (Lake Sand Closure, Shoreline Protection, and Canals 1 - 6).
2. Scatlake soils were mapped at only three project items (Canals 7 - 9).

completely decomposed, semifluid organic material.

The Scatlake Association comprises approximately six percent of Iberia Parish. The association consists of approximately 80 percent Scatlake soils and 20 percent Placedo and Lafitte soils (Clark and White 1978:6). Found in soft marshes across Marsh Island, with elevations at or near sea level, these soils are subject to occasional deep flooding by storm tides. Scatlake soils have a surface layer of mucky peat that measures approximately 15.3 cm (6 in) thick. This deposit overlies approximately 15.3 cm (6 in) of very dark gray semifluid mucky clay. The underlying material is dark-gray, black, gray, and greenish-gray semifluid clay and mucky clay. Scatlake soils are very poorly drained, very slowly permeable, and saline (Clark and White 1978:9).

Floral Communities

Historically, in Iberia Parish, the major rivers and streams of the Coastal Plain have comprised an oak-pine region that approximates the bottomland communities found throughout the Southeast. This area is characterized by a wide range of oak and hickory species with shortleaf and loblolly pines common to the drier uplands. Other common trees include willow (*Salix nigra*), hackberry *(Celtis laevigata)*, backbrush (*Baccharis halimifolia*), waxmyrtle (*Myrica cerifera*), and cottonwood (*Populus deltoides*). The understory typically is dominated by shrubby species including persimmon (*Diospyros virginiana*), hawthorn (*Crataegus spp.),* sassafras (*Sassafras albidum*), holly (*Ilex spp.*), mulberry (*Morus rubra*), and wax myrtle (*Myrica cerifera*) (Table 2). Several vining species (e.g., grapes, catbriars, and brambles) are associated with open portions of this forest type. Due to the rich diversity of mast and fruit producing species found in the oak-pine region, "it is reasonable to expect that higher animal densities could be supported than in the pine dominated region" (Story 1990:15). It is probable that Native American populations within upper Iberia Parish would have focused their subsistence efforts on this region due to the variety of plants and animals associated with it.

Marshes, on the other hand, are commonly classified according to the present vegetation assemblage and its tolerance to various salinity levels. The pioneering mapping of Louisiana marsh vegetation was accomplished by O'Neil (1949). According to this work, marshes situated in the northern part of the project area are designated as excessively drained salt marsh. This is based on the presence of black rush (*Juncus roemericanus*), wiregrass (*Spartina patens*), and oyster grass (*Spartina alterniflora*). The southern part of the project area is gradational into brackish three-cornered grass marsh dominated by three-cornered grass (*Spartina olneyi*) and wiregrass. In a later mapping effort, Chabreck and Linscombe (1978) identified the above species and also coco (*Scirpus robustus*) and widgeongrass (*Ruppia maritima*). Other grasses and plants found on Marsh Island include hog cane (*Spartina cynosuroided*), saltgrass (*Distichlis spicata*), leafy three-square (*Scirpus Robustus*), and feather grass (*Panicum virgatum*) (Louisiana Department of Wildlife and Fisheries 1949) (Table 3).

Faunal Communities

Iberia Parish has a total land area of 414,080 ac (167,578.2 ha) which is about equally divided between openland, woodland, and marsh (Clark and White 1978:38). In 1970, approximately 77 percent of that area was dedicated to some form of crop cultivation. Since that time, however, there has been a decline in the amount of agricultural acreage due primarily to urban expansion. Modifications to the natural environment have resulted in a loss of suitable wildlife habitat, causing a reduction in diversity and population of the local fauna and flora.

The largest populations of wild game animals and birds are those associated with the openlands. Some of these are: eastern cottontail rabbit; (*Sylvilagus floridanus*); doves, such as the mourning dove *(Zenaida macroura)* and rock dove (*Columba livia*); bobwhite quail (*Colinus virginianus*); and the common snipe (*Capella gallinago).* Rice is a dietary favorite of the dove and many of these birds are seen around the harvested rice fields of the Lafayette area. The common snipe, whose populations are influenced by the rainfall patterns, is commonly seen around the flooded rice fields. Urban sprawl and high agricultural usage has led to a loss of suitable habitats

Table 2. Plant Taxa of Swamps and Levees in Iberia Parish.

COMMON NAME	LATIN NAME	SWAMPS	LEVEE
Drummond red maple	*Acer drummondii*	x	x
Box elder	*Acer negundo*	x	x
Wild onion	*Allium canadense*		x
Pigweed	*Amaranthus* spp.		x
Common ragweed	*Ambrosia artemisiifolia*		x
Peppervine	*Ampeopsis arborea*	x	x
Hog peanut	*Apios americana*	x	x
Green dragon	*Arisaema dracontium*	x	
Jack-in-the-pulpit	*Arisaema triphyllum*	x	
Cane	*Arundinaria* spp.	x	x
Rattan vine	*Berchemia scandens*		x
False nettle	*Boehmeria cylindrica*		x
Trumpet creeper	*Campsis radicans*	x	x
Sedges	*Carex* spp.		x
Water hickory	*Carya aquatica*	x	x
Bitternut hickory	*Carya cordiformis*	x	x
Pecan	*Carya Illinoensis*		x
Sugarberry	*Celtis laevigata*	x	x
Buttonbush	*Cephalanthus occidentalis*	x	
Spiny thistle	*Cirsium horridulum*		x
Virginia dayflower	*Commelina virginiana*		x
Dogwood	*Cornus* spp.		x
Swamp dogwood	*Cornus stricta*	x	
Hawthorn	*Crataegus* spp.	x	x
Swamp lily	*Crinum americanum*	x	
Titi	*Cyrilla racemiflora*	x	
Rattlebox	*Daubentonia texana*		x
Persimmon	*Diospyros virginiana*		x
Horseweed	*Erigeron canaddensis*		x
Mistflower	*Eupatorium coelestinum*		x
Swamp privet	*Forestiera acuminata*	x	x
Pumpkin ash	*Fraxinus profunda*	x	
Ashes	*Fraxinus* spp.		x
Bedstraw	*Galium aparine*		x
Water locust	*Gleditsia aquatica*	x	x
Honey locust	*Gleditsia triacanthos*		x
Marshmallow	*Hibiscus* spp.		x
Pennywort	*Hydrocotyle* spp.		x
Possum haw	*Ilex decidua*	x	x
Yaupon	*Ilex vomitoria*		x
Touch-me-not	*Impatiens capensis*		x
Marsh elder	*Iva frutescens*	x	
Wild lettuce	*Lactuca canadensis*		x
Sweetgum	*Liquidambar styraciflua*	x	x
Magnolias	*Magnolia* spp.	x	x
Sensitive plant	*Mimosa strigillosa*		x
Red mulberry	*Morus rubra*		x
Wax myrtle	*Myrica cerifera*		x
Tupelogum	*Nyssa aquatica*	x	
Black gum	*Nyssa biflora*	x	x

Table 2, continued

COMMON NAME	LATIN NAME	SWAMPS	LEVEE
Virginia creeper	*Parthenocissus quiquefolia*	x	
Maypops	*Passiflora* spp.	x	x
Swamp bay	*Persea palustris*	x	x
Water elm	*Planera aquatica*	x	x
Sycamore	*Platanus occidentalis*	x	x
Mayapple	*Podophyllum peltatum*		x
Knotweeds	*Polygonum* spp.		x
Ressurection fern	*Polypodium polypodioides*	x	x
Water oak	*Quercus nigra*	x	
Willow oak	*Quercus phellos*	x	
Oaks	*Quercus* spp.		x
Swamp honeysuckle	*Rhododendron viscosa*	x	x
Poison ivy	*Rhus radicans*	x	x
Snout bean	*Rhynchosia minima*		x
Brambles	*Rubus* spp.		x
Palmetto	*Sabal minor*	x	x
Black willow	*Salix nigra*	x	
Elderberry	*Sambucus canadensis*	x	
Sassafras	*Sassafras albidum*	x	
Skullcap	*Scutellaria ovata*		x
Cat/green briar	*Smilax* spp.	x	x
Wild bean	*Strophostyles helvola*		x
Baldcypress	*Taxodium distichum*	x	
Shield fern	*Thelypteris normalis*		x
Spanish moss	*Tillandsia usneoides*	x	x
American elm	*Ulmus americana*		x
Stinging nettle	*Urtica chamaedryoides*		x
Ironweed	*Veronia altissima*		x
Grapes	*Vitis* spp.	x	x

Table 3. Plant Taxa of Marshes with Salinity Affiliations.

COMMON NAME	LATIN NAME	SALINE	BRACKISH	FRESH
Coast milkweed	*Asclepias lanceolata*		x	
Aster	*Aster* spp.			x
Backbrush	*Baccharis halimifolia*		x	
Water hyssop	*Bacopa monnieri*		x	x
Carex	*Carex* sp.		x	
Centella	*Centella asiatica*		x	
Coontail	*Ceratophyllum demersum*			x
Saw-grass	*Cladium jamaicense*			x
Gulf croton	*Croton punctatus*	x		
Umbrella-sedges	*Cyperus* spp.		x	x
Salt grass	*Distichlis spicata*	x	x	
Walter's millet	*Echinochloa walteri*		x	x
Spikerush	*Eleocharis* spp.		x	x
Sand rush	*Fimbristylis castanea*		x	
Marsh mallow	*Hibiscus moscheutos*		x	
Whorled pennywort	*Hydrocotyle verticillata*			x
Spider lily	*Hymenocallis caroliniana*		x	x
Morning glories	*Ipomoea* spp.		x	x

Table 3, continued

COMMON NAME	LATIN NAME	SALINE	BRACKISH	FRESH
Marsh elder	*Iva frutescens*		x	x
Rushes	*Juncus* spp.	x	x	x
Virginia saltmarsh mallow	*Kosteletzkya virginica*		x	x
Cutgrass	*Leersia* sp.		x	
Sprangle top	*Leptochloa fascicularis*		x	x
False loosestrife	*Ludwigia leptocarpa*			x
Loosestrife	*Lythrum lineare*		x	
Wax myrtle	*Myrica cerifera*			x
White waterlily	*Nymphea odorata*			x
Maidencane	*Panicum hemitomon*			x
Panicoid grasses	*Panicum* spp.		x	x
Paspalum	*Paspalum* spp			x
Canary grass	*Phalaris* sp.		x	
Common reed	*Phragmites commmunis*		x	x
Camphorweed	*Pluchea camphorata*		x	x
Smartweed	*Polygonum* spp.			x
Sago pondweed	*Potamogeton pectinatus*		x	
Arrowhead	*Sagittaria* spp.			x
Creeping glasswort	*Salicernia virginica*	x		
Black willow	*Salix nigra*			x
Common elderberry	*Sambucus canadensis*		x	x
Bulrush	*Scirpus* spp.	x	x	x
Rattlebox	*Sesbania* spp.			x
Yellow foxtail	*Setaria glauca*		x	x
Marsh-grass	*Spartina* spp.	x	x	x
Coast dropseed	*Sporobalus virginicus*		x	
Sea blite	*Sueda tineans*	x		
Gramagrass	*Tripsacum dactyloides*		x	
Cattail	*Typha* spp.			x
Deerpea	*Vigna luteola*		x	x
Giant cutgrass	*Zizaniopsis miliacea*			x

for many faunal species; however, the low ground cover protection provided by underbrush in fields and sugarcane crops has allowed the bobwhite quail and the cottontail rabbit to maintain average populations (Smith 1977:28).

Migratory waterfowl also are common to the coastal areas of Iberia Parish. On Marsh Island alone, between October 9, 1958 and May 14, 1959, approximately 887,000 birds comprising over 13 different species were inventoried (Louisiana Department of Wildlife and Fisheries Commission 1959). These included, but were not limited to: Mallards (*Anas platyrhynchos*), Common Goldeneyes (*Bucephala clangula*), Blue winged Teals (*Anas discors*), Green winged Teals (*Anas crecca*), Lesser Scaupes (*Aythya affinis*), Mergansers (*Mergus serrator*), Snow Goose (*Chen caerulescens*), Snowy Egrets (*Egretta thula*), and Blue Herons (*Ardea herodias*) (Tables 4 and 5).

Within the parish, White-tailed deer (*Odocoileus virginianus)*, Eastern gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), swamp rabbit (*Sylvilagus aquaticus)*, wood duck (*Aixs sponsa*), and the American woodcock (*Philohela minor)* are all woodland game whose habitat has shrunk with the decline of woodland acreage. Although there has also been a decline in small furbearing mammals inland from the coast, managed populations of furbearing mammals, including muskrat (*Ondatra zibethicus),* mink (*Mustela vison)*, nutria (*Myocastor coypus)*, otter (*Lutra canadensis)*, raccoon (*Procyon lotor varius*), and white-tailed deer (*Odocoileus virginianus)*, continue to thrive on Marsh Island (Table 6).

Table 4. Birds Present in the Iberia Parish Area.

COMMON NAME	LATIN NAME
Red-winged blackbird	*Agelaius phoeniceus*
Cedar waxwing	*Bombycilla cedrorum*
Great horned owl	*Bubo virginianus*
Red-tailed hawk	*Buteo jamaicensis*
Red-shouldered hawk	*Buteo lineatus*
Broad-winged hawk	*Buteo platypterus*
Willet	*Catoptrophorus semipalmatus*
Common nighthawk	*Chordeiles minor*
Yellow-billed cuckoo	*Coccyzus americanus*
Common flicker	*Colaptes auratus*
Black vulture	*Coragyps atratus*
Common crow	*Corvus brachyrhynchos*
Yellow rail	*Coturnicops noveboracensis*
Downy woodpecker	*Dendrocapos pubescens*
Acadian flycatcher	*Empidonax varescens*
American kestrel	*Falco sparverius*
Wood thrush	*Hylocichla mustelina*
Wild turkey	*Meleagris gallopavo*
Mockingbird	*Mimus polyglottos*
Common screech owl	*Otus asio*
American woodcock	*Philohela minor*
Barred owl	*Strix varia*
Brown thrasher	*Toxostoma rufum*
Robin	*Turdus migratorius*
Mourning doves	*Zenaida macroura*

Table 5. Birds Present in the Marshes of the Proposed Project Area.

COMMON NAME	LATIN NAME
Spotted sandpiper	*Actitis macularia*
Red-winged blackbird	*Agelaius phoeniceus*
Seaside sparrow	*Ammodramus maritimus*
Pond ducks	*Anas* spp.
Greater white-fronted goose	*Anser albifrons*
Great blue heron	*Ardea herodias*
Short-eared owl	*Asio flammeus*
Diving ducks	*Aythya* spp.
Solidary sandpiper	*Bartramia longicauda*
American bittern	*Botaurus lentiginosus*
Green-backed heron	*Butorides striatus*
Sandpiper	*Calidris* spp.
Snipe	*Capilla gallinago*
Great egret	*Casmerodius albus*
Boat-tailed grackle	*Cassidix major*
Belted kingfisher	*Ceryle alcyon*
Killdeer	*Charadrius vociferus*
Snow goose	*Chen caserulescens*
Black tern	*Childonias niger*
Common nighthawk	*Chordeiles minor*
Northern harrier	*Circus cyaneus*
Wrens	*Cistothorus spp.*
Fish crow	*Corvus ossifragus*

Table 5, continued

COMMON NAME	LATIN NAME
Yellow rail	*Coturnicops noveboracensis*
Heron/egret	*Egretta* spp.
White ibis	*Eudocimus albus*
Merlin	*Falco columbarius*
Artic peregrine falcon	*Falco peregrinsus tundrius*
American kestrel	*Falco sparverius*
Magnificent frigate bird	*Fregata magnificens*
Common snipe	*Gallinago gallinago*
Common moorehen	*Gallinula chloropus*
Common yellowthroat	*Geothlypis trichas*
Bald eagle	*Haliaeetus leucocephalus*
Black-necked stilt	*Himantopus mexicanus*
Swallows	Hirundinidae family
Louisiana heron	*Hydranassa tricolor*
Least bittern	*Ixobrychus exilis*
Gulls	*Larus* sp.
Black rail	*Laterallus jamaicensis*
Hooded merganser	*Lophodytes cucullatus*
Belted sandpiper	*Meaceryle alcyon*
Swamp sparrow	*Melospiza georgiana*
Red-breasted merganser	*Mergas serrator*
Barn swallow	*Mirundo rustica*
Wood stork	*Mycteria americana*
Night-heron	*Nycticorax* spp.
Savannah sparrow	*Passerculus sanwichensis*
American white pelican	*Pelecanus erythorhynchus*
Brown pelican	*Pelecanus occidentalis*
Double crested cormorant	*Pharacrocorax auritus*
Glossy ibis	*Plegadis falcinellus*
Black-bellied plover	*Pluvialis squatarola*
Eared grebe	*Podiceps nigricollis*
Purple gallinule	*Porphycula martinica*
Boat-tailed grackle	*Quiscalus major*
Rails	*Rallus* spp.
Bank swallow	*Riparia riparia*
Terns	*Sterna* sp.
Tree swallow	*Tachycineta bicolor*
Royal tern	*Thalasseus maximus*
Sandpiper/yellow-legs	*Tringa* spp.

Note: Some of these species are only seasonal residents.

A variety of marine resources may be found in the Atchafalaya River and basin and Vermillion Bay. The Atchafalaya River and its assorted lakes and bayous contain fresh water and are highly productive in both commercial and sport fishing. The major freshwater species found in these areas are bass (*Micropter spp.*), bluegill (*Lepomis macrochirus*), crappie (Pomoxis spp.), catfish (Ictaluridae), and gar (*Lepisosteus spp.*) (Table 7). Vermillion Bay and its associated brackish estuaries produce large amounts of crab, shrimp, and saltwater fish (Table 8). Oyster beds can be found along the shores of the bay and on the north and east side of Marsh Island.

Reptile communities within Iberia Parish include the spotted salamander (*Ambystoma maculatum*), tiger salamander (*Ambystoma tigrinum*), Eastern spadefoot (*Scaphiopus holbrooki*), bullfrog (*Rama catesbeiana)*, southern toad (*Bufo terrestris*), American toad (*Bufo americanus)*, spring peeper (*Hyla crucifer*), chorus frog (*Pseudacris triseriata*), gray tree frog (*Hyla versi-*

Table 6. Mammals Present in Iberia Parish.

COMMON NAME	LATIN NAME
Fin whale family	Balaenopteridae family
Red wolf	*Canis rufus*
Least shrew	*Cyptotis parva*
Porpoise and dolphin family	Delphinidae family
Southern flying squirrel	*Glaucomys volans*
Red bat	*Lasiurus borealis*
Northern yellow bat	*Lasiurus intermedius*
Seminole bat	*Lasiurus seminolus*
River otter	*Lutra canadensis*
Bobcat	*Lynx rufus*
Long-tailed weasel	*Mustela frenata*
North American mink	*Mustela vison*
Southeastern myotis	*Myotis austroriparius*
Eastern wood rat	*Neotoma floridana*
Evening bat	*Nycticeius humeralis*
White-tailed deer	*Odocoileus virginianus*
Common muskrat	*Ondatra zibethicus*
Marsh rice rat	*Oryzomys palustris*
Cotton mouse	*Peromyscus gossypinus*
White-footed mouse	*Peromyscus leucopus*
Sperm whale family	Physeteridae family
Rafinesque's big-eared bat	*Plecotus rafinesquii*
Northern raccoon	*Procyon lotor*
Fulvous harvest mouse	*Reithrodontomys fulvescens*
Gray squirrel	*Sciurus carolinensis*
Fox squirrel	*Sciurus niger*
Hispid cotton rat	*Sigmodon hispidus*
Swamp rabbit	*Sylvilagus aquaticus*
Eastern cottontail rabbit	*Sylvilagus floridanus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Gray fox	*Urocyon cinereoargenteus*
Black bear	*Ursus americanus*
Beaked whale family	Ziphiidae family

Note: Nutria (Myocaster coypus) is an introduced species

color), and green tree frog (*Hyla cinerea*). Common amphibians in the parish include the eastern fence lizard (Sceloporus undulatus), ground skink (*Scincella lateralis*), five-lined skink (*Eumesis fasciatus*), slender glass lizard (*Ophiaurus attenatus*), racer (*Coluber constrictor*), eastern hognose (*Heterodon platyrhinos*), mud snake (*Farancia abacura),* smooth green snake (*Opheodrys vernalis*), brown snake (*Storeria dekayi*), and common king snake (*Lampropeltis getulus).* Some examples of the poisonous snakes or pit vipers common to the area include: copperhead (*Agkistrodon contorix*), cotton mouth (*Agkistrodon piscivorus),* eastern diamondback rattlesnake (*Crotalus adamanteus),* and the timber rattlesnake (*Crotalus horridus)* (Table 9). The alligator (*Alligator mississippiensis*) also can be found in the project area.

The faunal populations have suffered from the effects of civilization. Urban spread has reduced the areas for suitable faunal habitats. Pollution of the lakes, streams, and rivers has reduced the fish population. Several faunal species are recognized by both federal and state agencies as threatened with the possibility of extinction. The Louisiana Black Bear has become a threatened species and is likely to join the growing list of animals endangered by extinction. The eastern diamond-backed rattlesnake (*Crotalus adamanteus)* also is considered extremely rare in Louisiana. Both state and federal agencies consider many of the migratory and stationary bird species to be threatened or endangered of extinction. Some of these are the glossy ibis (*Plegadis falcinellus*), the golden eagle (*Auqila chrysaetos*), the bald eagle (*Haliaeetus leucocephalus*), the interior least tern (*Sterna anrtillarum athalassos*), the caspian tern (*Sterna caspia*), the gull-billed tern (*Sterna nilotica*), and the sooty tern (*Sterna fuscata*) (Louisiana Department of Wildlife and Fisheries 1997).

The ability of fauna to thrive is dependent upon the availability of suitable habitat to provide access to appropriate food and shelter from natural predators. Extensive agricultural practices and urban development deplete both food sources and protective cover. Pollutants have reduced and can even eliminate suitable habitats. Both factors have played a significant roll in reducing the diversity and size of the faunal communities found within Iberia Parish.

Climate

Iberia Parish is characterized by a subtropical, humid climate with comparatively mild winters. Weather patterns are influenced by the combination of warm, moist air masses moving north from the Gulf of Mexico and cold, dry air masses moving south from the northern regions; these shifts can create large seasonal variations in temperature and humidity. Transitions from one flow to the other bring significant, and sometimes

Table 7. Fish Present in Iberia Parish with Salinity Affiliations.

COMMON NAME	LATIN NAME	FRESH	ESTUARY	SEASONAL ESTUARY
Bowfin	*Amia calva*	x		
Bay anchovy	*Anchoa mitchilli*			x
American eel	*Anguilla rostrata*	x		
Pirate perch	*Aphredoderus sayanus*	x		
Freshwater drum	*Aplodinotus grunniens*	x		
Sheephead	*Archosargus probatocephalus*			x
Sea catfish	*Arius felis*			x
Silversides	Atherinidae family	x	x	
Gafftop catfish	*Bagre marinus*			x
Atlantic threadfin	*Bolydactylus octonemus*			x
Gulf menhaden	*Brevoortia patronus*			x
River carpsuckers	*Carpoides carpio*	x		
Atlantic spadefish	*Chaetodipterus faber*			x
Seatrout	*Cynoscion sp.*			x
Sheepshead minnow	*Cyprinodon variegatus*		x	
Killifish	Cyprinodontidae famlily		x	
Carp	*Cyprinus carpio*	x		
Southern stingray	*Dasyatis americana*			x
Bluntnose stingray	*Dasyatis sayi*			x
Shad	*Dorosoma spp.*	x		
Banded pygmy sunfish	*Elassoma zonatum*	x		
Ladyfish	*Elops saurus*			x
Fringed flounder	*Etropus crossotus*			x
Lyre goby	*Evorthodus syricus*		x	
Gulf killifish	*Fundulus grandis*		x	
Topminnows	*Fundulus spp.*	x		
Mosquitofish	*Gambusia affinis*	x		
Goby	Gobiidae family			x
Naked goby	*Gobiosoma bosci*		x	
Least killfish	*Heterandria formosa*	x		
Freshwater catfish	Ictaluridae family	x		
Brook silverside	*Labidesthes sicculus*	x		
Pinfish	*Lagodon rhomboides*		x	
Gars	*Lepisosteus spp.*	x		
Sunfishes	*Lepomis spp.*	x		
Atlantic croaker	*Mecropogon undulatus*			x
Tarpon	*Megalops atlantica*			x
Tidewater silverside	*Menidia beryllina*			x
Southern kingfish	*Menticirrhus americanus*			x
Atlantic croaker	*Micropogonais undulatus*			x
Largemouth bass	*Micropterus salmoides*	x		
Basses	*Morone spp.*	x		
Striped mullet	*Mugil cephalus*			x
Golden shiner	*Notemigonus crysoleucas*	x		
Shiners	*Notropis spp.*	x		
Southern flounder	*Paralichthys lethnostigma*			x
Bullhead shiner	*Pimephales vigilax*	x		
Sailfin molly	*Poecilia latipinna*	x		
Black drum	*Pogonias cromius*			x
Paddle fish	*Polydon spathula*	x		
Crappie	*Promoxis sp.*	x		
Red drum	*Sciaenops ocellata*			x
Hogchoker	*Trinectes maculatus*			x

Table 8. Crustaceans and Shellfish Present in the Proposed Project Area with Salinity Affiliations.

COMMON NAME	LATIN NAME	FRESH	ESTUARY
Freshwater clam	*Anodonta* sp.	x	
Hooked mussel	*Brachidontes recurvus*		x
Blue crab	*Callinectes sapidus*		x
Oyster	*Crassostrea virginica*		x
Freshwater clam	*Elliptio* sp.	x	
Marsh periwinkle	*Littorinia irrorata*		x
River shrimp	*Macrobrachium ohiome*	x	
Ribbed mussel	*Modiolus demissus*		x
Freshwater mussel	*Mytilopsis leucopuaeta*	x	
Eastern nassa	*Nassarius vibex*		x
Grass shrimp	*Palaemonetes paludosus*		x
Brown shrimp	*Penaeus aztecus*		x
White shrimp	*Penaeus setiferus*		x
Freshwater snail	*Physa* sp.	x	
River crawfish	*Procambarus blandingii*	x	
Red swamp crawfish	*Procambarus clarkii*	x	
Brackish water clam	*Rangia cuneata*		x
Mud crab	*Rithropenopeus harrisii*		x

Table 9. Reptiles and Amphibians Present in the Proposed Project Area.

COMMON NAME	LATIN NAME
Northern cricket frog	*Acris crepitans*
Copperhead	*Agkistrodon contrortix*
Cottonmouth	*Agkistrodon piscivorus*
American alligator	*Alligator mississippiensis*
Three-toed amphiuma	*Amphiuma tridactylum*
Green anole	*Anolis caroliniensis*
True toads	Bufonidae family
Snapping turtle	*Chelydra serpentina*
River cooter	*Chrysemys concinna*
Painted turtle	*Chrysemys picta*
Pond slider	*Chrysemys scripta*
Racer	*Coluber constrictor*
Newts	*Diemictylus* spp.
Chicken turtle	*Dierochelys reticularia*
Ratsnakes and cornsnakes	*Elaphe* spp.
Mud snake	*Farancia abacura*
Eastern narrowmouth toad	*Gastrophryne carolinensis*
Mississippi mud turtle	*Graptemys komni*
Treefrogs	Hylidae family
Mud turtle	*Kinosternon subrubrum*
Speckled king snake	*Lampropeltis getulus*
Green water snake	*Natrix cyclopion*
Plain-bellied water snake	*Natrix erythrogaster*
Banded water snake	*Natrix fasciata*
Diamond-backed water snake	*Natrix rhombifera*
Water snakes	*Nerodia* spp.
True frogs	Ranidae family
Crayfish snake	*Regina* spp.
Lesser siren	*Siren intermedia*
Stinkpot	*Sternotherus odoratus*
Brown snake	*Storeria dekayi*
Box turtles	*Terrapene* spp.
Garter snakes	*Thamnophis* spp.
Spiny softshell	*Trionyx spiniferus*

abrupt, weather changes (Clark and White 1978:61). While portions of Iberia Parish may reach elevations of 45.7 m (150.0 ft), the flat marshland found in the project area generally averages 0.61 m (2.0 ft) amsl. Therefore, surface elevation is not a major factor influencing weather patterns throughout the area.

The average annual temperature for the region is approximately 13.2° C (55.7° F), with temperature extremes ranging from a high of 38.3° C (101° F) recorded in 1960 to a low of 14.5° C (6° F) recorded in 1899. Daily average summer temperatures range from a minimum of approximately 21° C (70° F) to a maximum of approximately 32.8° C (91° F). Daily average winter temperatures range from a minimum of 6.1° C (43° F) to a maximum of 28.4° C (83° F), with the potential for freezes occurring between October and March. Glaze or icestorms are rare and snowfall is negligible.

Iberia Parish has an average yearly rainfall of approximately 141.5 cm (55.7 in), with June and July being the wettest months. The highest monthly average precipitation of 19.1 cm (7.5 in) falls during July. Local showers and thunderstorms are common during the summer months of June, July, and August, occurring on an average of 70 to 80 days per year. Fall and winter generally have the fewest rainy days while November and January have the least (Clark and White 1978:61). Occasionally there are periods of prolonged dry weather and some areas within the parish have gone as long as a month without any measurable rainfall.

CHAPTER III

PREHISTORIC CULTURAL SETTING

As examined in the previous chapter, the proposed Marsh Island Hydrologic Restoration Project areas are located on and around Marsh Island in Iberia Parish, Louisiana. This barrier island occupies a saline marsh that separates Vermilion Bay from Atchafalaya Bay. It represents an extension of the Chenier Plain and it functions as a transitional zone between the mainland and the deltaic marshes of the Mississippi Alluvial Valley. The proposed project areas contain both terrestrial and maritime components.

In 1983, the Louisiana Division of Archaeology, in an effort to "approach the preservation of archaeological resources on a regional and local level," divided the state into six areas or "Management Units" (Smith et al. 1983). These units were defined by similarities in topography, cultural history, and land use patterns (Smith et al. 1983:19). Iberia Parish is located in Management Unit III, which encompasses approximately 9,194,822 ac (3,721,144 ha) and includes the parishes of Acadia, Allen, Beauregard, Calcasieu, Cameron, Evangeline, Iberia, Jefferson Davis, Lafayette, St. Landry, St. Martin, St. Mary, and Vermilion Parish (McGimsey 1997). Bordered to the west by the Sabine River and to the east by the Atchafalaya River, this unit includes the sparsely settled prairies and coastal marshes of southern and southwestern Louisiana. Marsh Island, located in Iberia Parish and in Management Unit III, is one of seven management areas under the oversight of the Louisiana Department of Wildlife and Fisheries (Smith et al. 1983:73). The project areas also lie within the Southeastern Culture Area of the United States (Muller 1983). As a result, cultural characteristics found within the proposed project area resemble those manifested in the Lower Mississippi Valley and along the northern coast of the Gulf of Mexico, as well as in other parts of the region.

The prehistory of Management Unit III extends from about 12,000 BC - AD 1700 and it can be divided into four general archeological stages. These four stages (Paleo-Indian, Archaic, Woodland, and Mississippian) represent developmental segments characterized by dominant patterns of subsistence and technology (Kreiger 1953; Willey and Phillips 1958). Each stage consists of a sequence of chronologically defined periods, which can be sub-divided into phases based on similar sets of artifacts and other cultural traits characteristic of a particular geographic region (e.g., Jenkins 1979; Walthall 1980). While different systems have been used over the years to organize and describe the culture history of the region (e.g., the Paleo-Indian, Meso-Indian, and Neo-Indian eras used by Neuman 1984), the syncretic stage-period-phase system described by Willey and Phillips (1958) and subsequently examined by Jenkins and Krause (1986) will be utilized in the discussion presented below.

In recent years, eight cultural units have been used to describe the prehistoric sequence of this management unit: Paleo-Indian, Archaic, Poverty Point, Tchefuncte, Marksville, Troyville-Coles Creek, Plaquemine, and Mississippian (Jeter et al. 1989; Smith et al. 1983). Research by Kidder (1988) suggests that Plaquemine Culture actually is a variant phase of the Emergent Mississippian Period, and it will be discussed as such. Constant refinements in the comparative or actual dating of artifacts, as well as in the assignment of cultural periods, phases, and horizons throughout the Southeast, have resulted in both the temporal

and spatial overlap of the material traits and lifeways associated with the various cultural units. The results of these refinements suggest varying degrees of independent invention and cultural diffusion, along with a technological persistence among indigenous populations. As a result, overlapping dates may be found throughout this review.

Paleo-Indian Stage (ca. 10,000 - 6000 BC)

The initial human occupation of the southeastern United States by the Paleo-Indians generally is believed to have occurred sometime between 10,000 and 12,000 years ago (8000 - 10,000 BC). Paleo-Indian sites are characterized by a distinctive assemblage of lithic tools that includes fluted and unfluted lanceolate projectile points/knives, unifacial end and side scrapers, gravers, and spokeshaves. Paleo-Indian lithic tools display a high level of workmanship in which fine flaking, edge grinding, retouching, and basal thinning are prominent (Neuman 1984; Smith et al. 1983).

The earliest Paleo-Indian Culture identified in North America has been named "Clovis," after the type-site in New Mexico. In the western United States, Clovis sites appear to fall within a relatively narrow time range, i.e., between 10,900 and 11,500 years ago (9550 - 8950 BC) (Haynes 1991; Story et al. 1990:178). While the evidence for earlier "pre-Clovis" or "pre-projectile point" human occupations continues to be debated (Chrisman et al. 1996), no earlier sites have been documented convincingly in North America.

The lithic tool assemblage of the Clovis Culture, and the similar Folsom Culture of the Great Plains and Southern Plains, generally is referred to as the Llano complex. This complex includes Clovis, Folsom, and Midland projectile points/knives. The smaller, fluted Folsom and unfluted Midland projectile points/knives once were thought to postdate Clovis; however, accepted radiocarbon dating of numerous Folsom components in Texas produced dates ranging from ca. 9050 - 8050 BC (Largent et al. 1991:323-332; Story et al. 1990:189). These dates suggest that Folsom Culture may be contemporaneous partially with Clovis Culture.

The Plano complex represents a similar tradition in the Southern Plains. In East Texas and Louisiana, this complex is represented by unfluted lanceolate Plainview, Firstview, Hell Gap, and Angostura projectile points/knives. These types first were thought to be unfluted variants of the Clovis type, but radiocarbon dating suggests a later temporal placement. Current data place the Plano complex from 8150 - 6050 BC (Turner and Hester 1985:66, 141). Plano-type artifacts have been found throughout Louisiana (e.g., Cantley and Kern 1984; Hillman 1990:206-207). Gagliano (1963:12) recovered a single Plainview projectile point/knife from near Jones Creek (the Palmer Site - 16EBR26), located near Baton Rouge.

Another Paleo-Indian tradition identified in North America is the Cody complex. This assemblage includes the stemmed lanceolate Scottsbluff and Eden projectile points/knives. Cody complex bifacial tools usually are identifiable by the presence of fine comedial pressure flaking. The uplands in the Texarkana region of northwest Louisiana, northeast Texas, and southern Arkansas have produced relatively large numbers of Cody Complex artifacts (Gagliano and Gregory 1965:62-77; Story et al. 1990:209), but the associated radiocarbon (^{14}C) dates have not been conclusive in determining the temporal range of the complex. Story et al. (1990:209) contend that these ^{14}C dates range from approximately 8200 - 7150 BC, although Turner and Hester (1985:149) place the Scottsbluff projectile point/knife at ca. 7120 - 6650 BC.

Paleo-Indian peoples are thought to have been highly mobile hunter-gatherers, organized in small bands or extended family groups. The formerly prevalent notion that the Paleo-Indian populations were represented by specialized big game hunters seems less tenable as information becomes available from a more inclusive set of Paleo-Indian sites. While sufficient evidence exists for the exploitation of large mammals (megafauna) including mammoth, mastodon, bison, caribou, and elk at sites in the western and northern United States, kill sites are rare in the Southeast. The occurrence of Clovis-like fluted projectile points/knives in the southeastern United States is thought to reflect contemporaneity with a culture similar to that represented at Clovis sites recorded in the western and northern parts of the country. Whether or not this suggests that big game hunting was a dominant adaptive strategy in the Southeast is less certain because of the re-

gional environmental differences associated with the availability of the big game species.

Excavations at the Kimmswick site in southeastern Missouri produced Clovis projectile points in direct association with disarticulated mastodon bones (Graham et al. 1981). Paleo-Indian tools also have been recovered in direct association with mastodon bones near Nashville, Tennessee. At the Coats-Hines Site (40WM31), 34 chert artifacts were recovered within the thoracic cavity of a mastodon (Breitburg et al. 1996). These artifacts consisted of 10 formal tools and tool fragments (one bifacial knife, two gravers, one prismatic blade, two uniface side scrapers, and two scrapers/cores) and 24 resharpening flakes. The presence of artifacts such as these in association with Pleistocene mega-fauna indicates that large animals did comprise at least a portion of the Paleo-Indian subsistence regime in the southern United States. In contrast, two locations in south central Louisiana, Avery Island (Salt Mine Valley; Site 16IB23) and the Trappey Mastodon Site (16LY63), produced the remains of Pleistocene fauna, but failed to provide a Paleo-Indian relationship (Gagliano 1964; Gibson and Miller 1973; Neuman 1984).

Although there are little data upon which to base a dietary reconstruction, Paleo-Indian subsistence throughout the Southeast, including the vicinity of the current project areas, is believed to have encompassed a broad spectrum of resources, including fish, fowl, deer, small mammals, nuts, and gathered plants (Smith 1986:9-10; Steponaitis 1986:369; Walthall 1980:36). The exception to the pattern could be the Folsom Culture. Folsom artifacts have been associated consistently with bison kill sites on the Great Plains. The lack of faunal evidence in association with Folsom finds in east Texas and Louisiana, due mainly to the highly acidic nature of the soils and the moist climate, precludes insight into the subsistence strategies of the area. Indications are that the Folsom Culture could represent an adaptation to a specialized hunting strategy associated with the cyclical migration of large herds of bison (Story et al. 1990:189).

Most of the archeological evidence associated with the Paleo-Indian occupation of the southeastern region is limited to surface finds of diagnostic projectile points/knives (Anderson et al. 1996; Mason 1962). In the Lower Mississippi Valley, Paleo-Indian projectile points/knives have been recovered along valley margins, but only occasionally in the alluvial valley or along the coastal plain. Distributional studies indicate that Paleo-Indian sites in the eastern United States tend to be located on eroded terrace and plateau surfaces (Walthall 1980).

Paleo-Indian and Early Archaic occupation of the Lower Mississippi Valley is best documented from Maçon Ridge, a relict Pleistocene braid plain in Northeast Louisiana (Saucier 1981). Hillman (1985, 1990) collected information concerning 121 sites on the Maçon Ridge from which over a thousand Paleo-Indian and "epipaleoindian" (Gibson 1982) projectile points/knives have been collected, including 272 Dalton-Meserve, 39 Hardin, and over 400 San Patrice examples. He concluded that Early and Middle Paleo-Indian occupation of Maçon Ridge apparently was sporadic or seasonal, possibly reflecting the somewhat inhospitable conditions caused by the excessive accumulation of wind-blown dust across open grasslands during the formation of the loess hills.

The distribution of recorded sites suggests that Maçon Ridge was occupied more intensely during the Late Paleo-Indian and Early Archaic Periods. However, during the Late Paleo-Indian Period, hunting camps and base camps normally were located very close to streams, ponds, or sloughs, on landforms elevated generally no more than 1 m (3.3 ft) above the water source. Settlement of areas adjacent to the waterways may reflect the intensive use of the wooded fringes situated along the waterways rather than the exploitation of the open grasslands. By the Early Archaic, settlement shifted to the higher elevations, possibly reflecting an environmental transformation of Maçon Ridge from open grasslands to open woodlands (Hillman 1990).

Brain (1983) states that Paleo-Indian projectile points/knives have been found along relict channels of the Mississippi River and remnant Pleistocene surfaces in the floodplain that predate ca. 7000 BC. Marshall (1984) noted that over 60 fluted projectile points/knives had been recorded in the Mississippi site files. In Louisiana, Paleo-Indian sites have been found along Tertiary upland ridges and uplands/floodplain bluffs (Guy and Gunn 1983). Projectile points/knives such as Clovis, Folsom, Scottsbluff,

Plainview, and Meserve have been found in surface contexts at these sites. The majority of these tools have been found in northern Louisiana; only a very few have been recovered in late Pleistocene age Prairie Terrace deposits in the southern part of the state.

The previously mentioned Avery Island Site (16IB3), situated near Banana Bayou, is the only substantial Early Paleo-Indian site that has been identified in Management Unit III. It is located on the Avery Island salt dome, near the coast of central Louisiana and northeast of the present project area. Although the site produced the remains of Pleistocene fauna intermingled with and/or above lithic artifacts and basketry remains, no diagnostic artifacts were recovered from this component (Gagliano 1970; Neuman 1984). Consequently, the relationship of the faunal remains to the artifacts is unclear.

From the Late Paleo-Indian Period, two cultural phases (the Strohe Phase and the Vatican Phase) have been suggested for the general region encompassing the proposed project area (Ryan et al. 1996). Little is known about the Vatican Phase in south central Louisiana, but the Strohe Phase of southwest Louisiana is better documented. This phase was defined by Bonnin and Weinstein (1975, 1978) following the identification of a Dalton-like projectile point type that was recovered during excavation of the multi-component Strohe Site (16JD10), located in Jefferson Davis Parish.

In the original publication of *Louisiana's Comprehensive Archaeological Plan*, and based on records obtained from the Division of Archaeology, only four Paleo-Indian sites/components were documented for Management Unit III (Smith et al. 1983:63). Respectively, these sites are located in Acadia, Evangeline, Iberia, and St. Landry Parishes. The Paleo-Indian component recorded at the Strohe Site (16JD10) was not included in the 1983 publication, nor were two other possible Paleo-Indian components identified at separate multicomponent sites (16AL1 and 16AL36) in Allen Parish.

Archaic Stage (ca. 6000 - 1550 BC)

The term "Archaic" first was developed in the second quarter of the twentieth century as a descriptor for the transitional pre-ceramic cultures that followed the Paleo-Indian Stage. The Archaic Stage can be divided into three subdivisions or periods: Early Archaic, Middle Archaic, and Late Archaic. A warming trend and a drier climate at the end of the Pleistocene, accompanied by a rise in sea level, may have spurred a combination of technological and social developments that are now associated with the initiation of the Archaic Stage (Willey and Phillips 1958). This economic shift has been correlated with highly diverse localized resource and food procurement strategies (Goodwin et al. 1991; Haag 1971). Caldwell (1958) termed this hunting and gathering specialization as "primary forest efficiency." Brain (1971) modified this phrase to "primary riverine efficiency" in reference to southeastern riverine and coastal communities.

Archaic peoples moved on a seasonal basis within a home range to exploit nuts, fruits, fish, game, shellfish, and other natural resources (Muller 1978). Archaic populations apparently exploited a greater variety of terrestrial and marine species than their Paleo-Indian predecessors. The increased number of sites dating from the Archaic Stage suggests an increase in population throughout the Southeast. Macrobands formed during the spring and summer months, while in the winter months, smaller microbands exploited upland ranges (Muller 1978). Burial sites dating from the Archaic Stage also have been found at numerous locales (Neuman 1984; Walthall 1980), suggesting a change in religious practices from earlier periods. Many populations with successful strategies during the Archaic sequence went on to develop the first semi-permanent settlements (Neitzel and Perry 1977).

An increase in the number of sites dating from the Archaic Stage suggests an overall increase in population throughout the area; *Louisiana's Comprehensive Archaeological Plan* lists 40 sites from this period for Management Unit III, versus only four sites dating from the Paleo-Indian Period (Smith et al. 1983). Previous investigations of the proposed project area, however, identified only one possible Archaic site within 1.6 km (1 mi) of the currently proposed areas of potential effect (APE) (see Chapter V).

The Paleo-Indian to Archaic transition was accompanied by changes in projectile point/knife morphology. These changes included the emergence of a wide variety of notched and stemmed projectile point/knife forms and the disappearance

of the fluted projectile point/knife type. Nevertheless, evidence suggests that there was some continuity between the adaptations of the Paleo-Indians and the later Archaic peoples who occupied the Southeast (Smith 1986). Archaic projectile point/knife sequences followed a general trend in haft morphology that progressed from side-notched to corner-notched to stemmed basal forms. These basal forms, however, were not mutually exclusive. Other Archaic Stage stone flaked artifact types included adzes, scrapers, and choppers. During the latter half of the Archaic Stage, granitic rock, chert, jasper, sandstone, slate, steatite, and scoria were ground and polished into a variety of stone ornaments and tools that included beads, gorgets, bowls, and celts/axes.

Early Archaic Period

In the Southeast, the Early Archaic Period is considered to begin at ca. 8050 - 6050 BC, but because of the regional variation and the temporal overlapping of stages, the assignment of Late Paleo-Indian and Early Archaic Period artifacts to correct temporal stages can be complex. As noted above, Gibson (1982) used "epipaleoindian" as a term for this transition, and Hillman (1985) included Dalton, Hardin, and San Patrice projectile point/knife types in his review of the transitional period at Maçon Ridge.

Dalton projectile points/knives temporally succeeded Clovis projectile points/knives and they have been dated between ca. 8550 and 7950 BC in Arkansas and Missouri (Goodyear 1982:382). At the Stanfield-Worley Bluff Shelter (1CT125) in northwestern Alabama, the Dalton zone dates from ca. 7750 - 7050 BC (DeJarnette et al. 1962; Griffin 1974). Dalton projectile points also have been found in Horizon 11 at the Koster Site (11GE4) in southern Illinois, which dates from approximately 6750 - 6500 BC. This date suggests that Dalton points/knives may extend later in time than initially presumed.

Dalton projectile points/knives sometimes are recovered with bifacially chipped stone adzes that may represent woodworking tools. Chipped and ground stone celts, probably the functional equivalent of Dalton adzes, have been recovered from the Kirk Horizon in Zone 16 at the St. Albans Site (46WV27), located in West Virginia, and from Early Archaic sites in the Little Tennessee River Valley (Smith 1986:14). Based on the ages of underlying geological deposits, the distribution of Dalton projectile points/knives and other artifacts associated with the Dalton Culture usually are restricted to northern Louisiana.

Some of the earliest recognized Terminal Paleo-Indian/Early Archaic projectile point/knife types identified in Louisiana are the San Patrice, Keithville, and Pelican forms (Webb et al. 1971). Previously ascribed to the area encompassing northwest Louisiana, northeast Texas, and southwest Arkansas, later investigations have extended the geographic range of San Patrice tool forms to include an area from central Texas to southwest Alabama, and from southern Louisiana to central Arkansas (Brain 1983:32; Cantley and Kern 1984; Giliberti 1995, personal communication).

The San Patrice Culture, an Early Archaic Period culture recognized in Louisiana, is believed to represent a local adaptation of hunter/gatherers within restricted ranges. A hallmark of San Patrice is the almost exclusive use of local lithic materials for the production of tools. Tool assemblages include San Patrice and Keithville projectile points/knives, hafted scrapers, Albany side scrapers, unifacial scrapers, burins, and engravers (Webb et al. 1971). Initially, the San Patrice projectile point/knife type consisted of varieties *Hope* and *St. John*, but more recently other varieties have been added to the assemblage in Louisiana, Mississippi, and Alabama (Brain 1983; Giliberti 1995, personal communication). On Maçon Ridge, Hillman (1985) reported that in addition to the *Hope* and *St. John* varieties, the San Patrice projectile point/knife variety (var.) *Keithville* also was present. More recently, archeological investigations in the western part of the state at Fort Polk have produced a number of San Patrice projectile points/knives of differing types, including one that contained a combination of Dalton/San Patrice/Holland stylistic affinities (Largent et al. 1992; Williams et al. 1996). Reliable radiocarbon dates for these types are virtually non-existent, but estimates based on morphology and stratigraphic placement place the period of production and use of these points from ca. 8050 - 6050 BC (Brain 1983:25; Story et al. 1990:202; Turner and Hester 1985:147; Webb 1981). Ensor (1986) suggests that the San Patrice projectile point/knife type, and related forms in the Southeast, may have de-

veloped from the earlier Dalton projectile point/knife forms. Story et al. (1990:197), however, suggest that both Dalton and San Patrice types evolved from the earlier fluted point traditions.

Throughout the Early Archaic, the subsistence pattern probably resembled that of the preceding Paleo-Indian Stage. Early Archaic peoples traveled seasonally in small groups between a series of base camps and extractive sites, hunting deer and collecting edible plants (Chapman and Shea 1981; Lentz 1986; Parmalee 1962; Parmalee et al. 1976).

Tools associated with food processing, including manos, milling stones, and nutting stones, first appear in Early Archaic Period sites. Commonly utilized plant foods, such as walnuts and hickory nuts, could be hulled and eaten without cooking or additional processing (Larson 1980). Herbaceous seeds, which became an important food source during the latter parts of the Archaic Stage, generally were absent from the diet during the Early Archaic Period (Chapman 1977; Lentz 1986). While living floors associated with hearths, shallow pit features, and milling tools are known from the Early and Middle Archaic, there is little evidence from the Early Archaic Period sites suggestive of below-ground food storage or of substantial structures (Steponaitis 1986:371).

Much of our knowledge regarding Paleo-Indian and Archaic lifeways is limited by problems of preservation. Lithic tools often are the only artifacts that survive, and they provide only limited information about a narrow range of human activities (i.e., manufacture and maintenance of tools, processing of meat and hides, and working of wood and bone). Although they rarely are preserved in the archeological record, clothing, baskets, and other artifacts made of perishable materials such as bone, wood, antler, shell, hair, hide, plant fiber, and feathers were no doubt an important part of the Archaic cultural tradition. Impressions of woven mats and net bags preserved in fired clay hearths from Kirk strata at the Icehouse Bottom Site (40MR23) in Eastern Tennessee provide rare insights into the richness of the Early Archaic material culture (Chapman and Adavasio 1977).

The Early Archaic cultures immediately preceding San Patrice are little understood in Louisiana. So far, diagnostic projectile points/knives dating from the Early Archaic Period, including Cache River, Calf Creek, Kirk, and Palmer, have been recovered only from questionable contexts and in limited numbers. Large Early Archaic sites, such as those identified in Florida, Georgia, Alabama, Tennessee, and the Carolinas, have yet to be recorded in Louisiana. Gagliano's (1963:12) survey of "preceramic" sites in southern Louisiana found that Kirk Serrated projectile points/knives were relatively common for the southeastern portion of the state, however, no cultural phases have been assigned to either the central or western portions of the state.

Middle Archaic Period

During the Middle Archaic Period, three interrelated events occurred that helped shape prehistoric cultural traditions. First, the effects of continental glaciation subsided, resulting in a warmer and drier climate, in which modern climatic and environmental conditions prevailed. Second, technological improvements were made, particularly with respect to groundstone, bone, and antler tool production. Finally, sociopolitical organization changed in some areas; an increased number of ranked societies and related social developments appeared.

The Middle Archaic Period throughout the southeastern United States is marked by several technological advances and by changes in subsistence patterns. Middle Archaic projectile points tend to be stemmed rather than notched types, such as Eva, Morrow Mountain, Sykes, Benton, and Newnan examples. In addition, the Middle Archaic is represented by projectile points/knives that include Evans, Morrow Mountain, Johnson, Edgewood, and possibly Calcasieu types (Campbell et al. 1990:96; Green 1991; Perino 1985:195). Excavations at Site 16VN791, located in Vernon Parish, Louisiana (i.e., northwest of the proposed project area in Management Unit I) produced evidence of a long tradition of corner notched projectile points/knives dating from the late Middle Archaic. It has been suggested that these points, and others in the region, were derived from types incipient to central Louisiana (Campbell et al. 1990).

Other technological innovations included the appearance of ground, pecked, and polished stone tools and the use of celts and grooved axes for

heavy woodworking, especially for the manufacture of dugout canoes. The atlatl, or spear thrower, first appeared during the Middle Archaic, as indicated by bone atlatl hooks and the appearance of ground stone bannerstones that apparently were attached to the spear thrower and may have served as atlatl counterweights or as fetishes.

The widespread occurrence of plant processing tools such as milling slabs, manos, and nutting stones suggests an increase in the utilization of plant foods. However, comparisons of floral and faunal assemblages from the Early Archaic show little change in the diversity or relative importance of plant species utilized. The Middle Archaic rough milling tools used in plant processing all have Early Archaic antecedents (Smith 1986:21).

Acorns and hickory nuts continued to be the most heavily utilized plant foods during the Middle Archaic Period. Remains of squash (*Curcurbita pepo*) and bottle gourds (*Lagenaria siceraria*) appeared for the first time during the Middle Archaic. The earliest occurrence of the bottle gourd dates from 5340 ± 120 radiocarbon years BC at the Windover Site (8BR246) in Florida (Doran et al. 1990). "Squash" rind dating from 5050 BC from the Napoleon Hollow (11PK500) and Koster (11GE4) Sites in west-central Illinois, initially identified as the cultivar (*C. pepo)*, now is thought to be representative of the Texas wild gourd (*C. texana*), rather than cultivated squash. Although the seeds of these plants are edible, it appears that their rinds were thin, woody, and inedible; these gourds probably were collected primarily for use as containers rather than as sources of food. Stronger evidence for the domestication of squash gourds occurs after 2350 BC, i.e., during the Late Archaic (Smith 1987).

In many areas, a major exception to this apparent continuity in earlier subsistence practices was a significant increase in the utilization of fish and shellfish. The rising importance of aquatic resources can be seen in the development of the extensive shell middens found along many of the southeastern rivers. Shell middens first appear between 4550 and 4050 BC during the Hypsithermal (Altithermal) climatic episode, when rivers entered a phase of aggradation and low flow, which promoted the development of oxbow lakes and shallow water shoal habitats favorable for mollusk growth and shellfish collection (Stein 1982). Although the food value of mollusks is low, these shellfish can be collected efficiently in bulk and appear to represent the economic focus for semi-sedentary Archaic Stage occupations for many parts of the southeastern United States (Russo et al. 1992).

Extensive, deep shell midden sites presumably represent seasonal reoccupation of favored locations by small social groups with band-type socio-political organization. Large cemeteries at some Middle Archaic sites, such as Carleston Annis (15BT5) in Kentucky and Windover (8BR246) and Little Salt Spring (8SO18) in Florida, represent interments made over long periods of time by groups who seasonally returned to these specific locations (Clausen et al. 1979). Increasing population during the Middle Archaic also may have led to more circumscribed territories, which is evidenced by the repeated occupation of favored locations and increased emphasis on locally available raw materials utilized in stone tool manufacture.

Recent research has demonstrated that earthwork and mound building activity occured at least in isolated instances during the Middle Archaic Period (Saunders 1994, 1996, 1997; Saunders et al. 1992, 1997). At present, a total of four possible Middle Archaic mound sites are known in northeast Louisiana, and these include Hedgepeth Mounds (Site 16LI7), Watson Brake Mounds (Site 16OU175), Frenchman's Bend Mounds (Site 16OU259), and Hillman's Mound (Site 16MA201). Of the four, the Watson Brake mound group (Site 16OU175) is the largest and the most securely dated at 5400 years BP (ca. 3450 BC) (Saunders et al. 1997:1797). The site consists of 11 mounds and connecting ridges constructed on a terrace above the Ouachita River flood plain. The civic structures at Watson Brake (Site 16OU175), and several other Middle Archaic sites, suggest that hunter-gatherer groups were capable of tasks that required relatively complex social organization and semi-sedentary living.

Additional evidence for emerging social differentiation during the Middle Archaic is seen in objects associated with child burials at sites like Indian Knoll in Kentucky (15OH2) (Webb 1946). Because status in egalitarian societies usually was acquired rather than inherited, and because buried

children probably did not live long enough to acquire much status, exotic status grave objects associated with child burials are seen as one of the earliest indications of inherited social rank.

Only one Middle Archaic Period phase currently is recognized in coastal Louisiana. The Banana Bayou Phase, identified in the Petit Anse region along the central part of the Gulf coast, is represented by the artifact assemblage observed by Gagliano (1964) at Avery Island, near Banana Bayou (Neuman 1984).

Late Archaic Period

For most of eastern North America, the Late Archaic represents the first cultural adaptation to an essentially modern environment. By 4000 years ago, the current bay tree-bald cypress, southern pine, southern pine-bald cypress, and oak-southern pine forests were established along both the Gulf and Atlantic Coastal plains (Delcourt and Delcourt 1981). The population structure and boundaries of those forest communities may have varied as a result of subsequent climatic changes, but they remained similar to their modern counterparts.

Evidence shows that the shorelines along the Atlantic and the Gulf still were stabilizing from approximately 3000 to 1000 BC; based upon the distribution of occupation surfaces of Late Archaic sites in those areas, sea levels generally were 1 to 2 m (3.3 to 6.6 ft) below present levels (DePratter and Howard 1980; Griffin and Smith 1954). DePratter and Howard (1980:33-34) also note that coastal conditions in many areas were not conducive to the development of oyster beds until Late Archaic times. Oyster beds and related resources, especially fish, were a significant factor in the structure of Late Archaic settlement along the Atlantic and eastern Gulf coasts. Many Late Archaic sites were associated with lower estuaries and upper bays, reflecting a subsistence regime that focused on the use of fish and shellfish. Furthermore, DePratter and Howard (1980:7) list three Late Archaic site types along the Atlantic Coast: circular shell rings/mounds, linear shell middens, and non-shell sites.

In the eastern United States, the Late Archaic subsistence economy focused on a few resources, including deer, mussels, and nuts. Jenkins (1979) recognized a seasonal procurement strategy in place in Middle Tennessee during the Late Archaic. During the spring, macrobands formed to exploit forested riverine areas. Archeological investigations of Late Archaic shell middens and mounds indicate a reliance on shellfish, fish, and riverine fauna and flora. During late fall and winter, Late Archaic peoples split into microbands and subsisted on harvested and stored nut foods and faunal species commonly found in the upland areas.

During this period, the southeast also witnessed the beginnings of indigenous plant domestication, based on a group of cultigens known as the Eastern Agricultural Complex. Although not found in the vicinity of the south Louisiana project area, the remains of domesticated squash, gourds and sunflower have been recovered from parts of Kentucky, Tennessee, north Alabama, and other regions of the Mid-South. While domesticated plants often imply the existence of a more sedentary lifestyle, the seasonal exploitation of resources was still an important element of the Late Archaic subsistence system. Finally, the latter part of the Archaic marked the beginning of trade networks inferred from the presence of exotic items such as those recovered from the burials at the Indian Knoll Site (15OH2) in Kentucky (Muller 1983).

Sites associated with this cultural period typically are found along the boundary of Quaternary and Tertiary areas with relatively flat or undulating bluff tops that overlook the floodplains. Within the Coastal Zone, Late Archaic sites appear on the Prairie terraces and relict levees (Gagliano 1963). According to Russo (1993:20) monumental earthworks also begin to appear at around 2750 BC.

The Late Archaic Period represents a time of population growth, evidenced by an increasing number of sites found throughout the United States (Griffin 1978). Stone vessels made from steatite, occasional fiber-tempered pottery, and groundstone artifacts characterize Late Archaic material culture. Late Archaic projectile point/knife types found throughout Louisiana include corner notched and stemmed forms.

Archaic style projectile points/knives commonly are found throughout the state; however, few of Louisiana's discrete, intact archeological deposits dating from the Archaic have been excavated systematically, analyzed, and comprehensively reported (Neuman 1984). Those few sites

that have been studied carefully in the west-central and northern part of the state have yielded projectile points/knives that include Gary, Kent, Palmillas, Carrollton, Marcos, Bulverde, Ensor, Ellis, Epps, Macon, Yarbrough, Motley, Pontchartrain, Delhi, and Sinner types. Groundstone objects recovered from these sites include celts/axes, plummets, and steatite bowl fragments (Campbell et al. 1990; Smith 1975). Although there is limited evidence for the proposed emergence of mortuary ceremonialism at this time, there is evidence for widespread trade in shell, copper, slate, greenstone, and jasper ornaments, including carved stone zoomorphic locust beads (Blitz 1993; Brose 1979; Smith 1986:31; Steponaitis 1986:374).

A total of three Late Archaic cultural phases, the generally contemporaneous Pearl River, Copell, and Bayou Blue phases, have been identified for coastal Louisiana. The Pearl River phase is found in the eastern part of the state and frequently is associated with either fresh or brackish water shell middens. The Copell phase has been identified in the Petit Anse region of south central Louisiana. In southwest Louisiana, the Bayou Blue Site (16AL1), the Late Archaic type site for the Bayou Blue phase, is an earthen midden situated on a natural levee that overlooks a relict channel of Bayou Blue in Allen Parish. Artifacts recovered from this site include projectile points/knives and lithic debitage that underlie a later, Marksville Period, occupation.

Poverty Point Culture (ca. 2000 - 500 BC)

Poverty Point represents a transitional culture that originated ca. 2000 BC, but did not develope fully until much later. As a result, the Poverty Point sphere of influence probably did not arrive in south central or southwest Louisiana until ca. 1500 BC (Gibson 1979, 1994; Neuman 1984; Pertula and Bruseth 1994). The Poverty Point Culture is best known for exhibiting several of the characteristics of a complex society, i.e., massive public architecture and long-distance trade, while maintaining a hunting and foraging economy (Jackson 1986:73). "Archaeological evidence of the Poverty Point Culture derives from at least seven, and possibly 10, isolated localities in the Lower Mississippi River Valley" (Gibson 1974:9). In Louisiana, these clusters consist of: Maçon Ridge-Joes Bayou (Poverty Point cluster), the Neimeyer-Dare group, and the Beau Rivage cluster (Gibson 1974:9). Four groups have been identified in Mississippi: the Savory cluster, the Jaketown cluster, the Teoc Creek cluster, and the Claiborne group (Gibson 1974:9). These clusters may represent chiefdoms which regulated the flow of exotic goods to the Poverty Point type site (16WC5) located in northeast Louisiana.

Both the Poverty Point Site (16WC5), and the neighboring Jackson Place Mounds (Site 16WC6) are situated adjacent to Bayou Maçon and near several major rivers, including the Mississippi, Tensas, Ouachita, and Boeuf. This riverine location was ideal for exploiting the flow of trade goods from other regions (Jeter and Jackson 1994:142; Muller 1978; Neitzel and Perry 1977) and for cultural diffusion. Evidence of long distance trade at Poverty Point includes ceramic artifacts similar to those from the St. Johns River region of Florida and lithic materials from deposits in Arkansas, Illinois, Indiana, Missouri, Ohio, Oklahoma, and Tennessee (Connaway et al. 1977:106-119; Gibson 1974:26, 1979, 1994a; Jeter and Jackson 1994; Lehmann 1982:11-18; Phillips 1996; Webb 1982:13-14). The Poverty Point Culture may represent the first chiefdom-level society to develop in the eastern United States (Gibson 1985a; Muller 1978).

The Poverty Point Site (16WC5) is distinguished primarily by its large earthworks and its complex microlithic industry. The earthworks include six segmented ridges, 15 to 46 m (50 to 150 ft) wide and approximately 1 to 2 m (3.3 to 6.6 ft) high, that form five sides of an octagon, and several other Poverty Point mounds scattered throughout the immediate site area. The largest mound, Mound A, may be a large bird effigy (Webb 1982). At the time of its construction, Poverty Point was the largest earthwork in the Americas.

The material culture of Poverty Point society was highly distinctive and it differentiates these sites from other Late Archaic Period sites. Typical Poverty Point Period projectile points include Carrollton, Delhi, Epps, Gary, Kent, Motley, and Pontchartrain (Smith et al. 1983:152; Webb 1982:22,47). Although first made during the Archaic Stage, these stemmed projectile point types frequently were manufactured from either novaculite or gray flint during Poverty Point times (Gibson 1994). The presence of exotic lithic ma-

terials may be an indicator of a Poverty Point Period site; these lithic materials include: "dark midwestern flint", Dover chert, Ozark chert, novaculite, magnetite, hematite, limonite, steatite, slate, quartz, galena, red jasper, and several others (Gibson 1974:9).

Materials associated with Poverty Point Culture also consist of atlatl weights, plummets, two hole gorgets, red jasper beads and owl pendants, thin micro flints/blades, Jaketown Perforators, baked clay cooking balls in dozens of geometrical shapes, clay figurines/fetishes, copper objects, and food storage and preparation containers. Container types included sandstone and steatite vessels, basketry, and untempered ceramic materials. Most ceramic vessels were sand tempered, although a minority of grit tempered, clay tempered, and untempered sherds and vessels have been recovered. After about 1350 BC, fiber tempered pottery appears (Jenkins 1982:55). Webb (1982) also reported the recovery of seed processing implements, polished stone hoe blades, nutting stones, and milling stones.

While little is known of the general everyday lifestyles of the people of the Poverty Point Culture, it is believed that patterns of hunting and gathering established during the Archaic Stage still were practiced (Connaway et al. 1977, and Webb 1982). Although gourd and squash were present and may have been cultivated (as suggested by the presence of chipped stone hoes with use polish), it appears that maize agriculture was never a part of the Poverty Point food procurement strategy (Smith 1986:35). Starchy and oily seeds were rare in flotation samples from the J. W. Copes Site (16MA47) and may have been of only limited significance (Fritz and Kidder 1993:6). Preferred resources appear to have been deer, pecan nuts (*Carya illinoensis*), and catfish (Jackson 1986).

Although earthen ovens also have been identified, baked clay balls (Poverty Point Objects [PPO]) and stone/ceramic containers may have provided the technological means for increasing the efficiency and caloric return of previously utilized resources such as pecans. Experiments show that boiling is a significantly more efficient means of extracting food value from *Carya* nuts than hand cracking; more nutmeat and oil are recovered through boiling (Munson 1988).

Brain (1971) perceives Poverty Point as a bottomland occurrence, while Webb (1982) suggests that Poverty Point sites typically are found in four locations. These areas include the Quaternary terraces or older land masses that overlook major stream courses, major river levees along active or relict river channels, river-lake junctions, and coastal estuaries or older land surfaces located within a coastal marsh area. Poverty Point sites appear to be located in areas ideal for exploiting forest-edge resources and for transporting exotic materials. Sites range in size from large ceremonial centers to more frequently identified hamlets or foraging stations. On several of the larger Poverty Point Culture sites, earthworks or shell middens occur either as mounds or in circular patterns.

In southeast Louisiana, small shell middens located along the shoreline of Lake Pontchartrain exhibit Poverty Point traits and suggest seasonal and specialized adaptations to marsh environments. These sites represent two phases of Poverty Point Culture: the Bayou Jasmine phase and the Garcia phase. Bayou Jasmine phase sites are located on the western shore of the lake as well as along the natural levee ridges of the Mississippi River distributaries. Garcia phase sites are located along the eastern shore of Lake Pontchartrain. The Garcia Site (16OR34), the type site for the Garcia phase, was found to contain a beach deposit of *Rangia* shells and midden debris. Radiocarbon dates from Bayou Jasmine phase components cluster around 3450 BP, while Garcia phase sites date about 1,000 years later (Gagliano 1963; Gagliano and Saucier 1963). Bayou Jasmine phase sites, such as the type site located along the western shore of the lake, exhibit Poverty Point traits exclusively (Duhe 1976). In contrast, Garcia phase sites, i.e., those found along the eastern shore, contain both bone tool, and microlithic industries (Gagliano and Saucier 1963).

Closer to the general vicinity of the currently proposed project areas, Phillips (1970) identified a Poverty Point phase that he labeled Rabbit Island. Sites associated with the Rabbit Island phase are situated in the Teche-Mississippi region of coastal Louisiana, and artifacts recovered from the type site include non-local lithic materials, microlithics, and baked clay objects (Gagliano 1963). Subsequently, the name Beau Rivage was applied by Gibson (1975) to four Poverty Point

sites (16LY5, 16LY6, 16LY13, and 16SL2) that he investigated along the Vermilion River, and that apparently represent a distinct phase. Beau Rivage is taken from the type site (16LY5) located within the Lafayette corporate limits, and sites of this phase are established in a different geographic setting than sites of the Rabbit Island phase; they are found to the northwest of the previously recorded Rabbit Island sites and they occupy the edge of the prairie terrace that overlooks the alluvial plain (Gibson 1980). A typical Beau Rivage artifact assemblage includes Poverty Point ceramic objects (clay balls and figurines) and lithic materials, but also is comprised of decorative rectangular or circular ceramic objects that have not yet been recovered at more inland Poverty Point locations. Diagnostic projectile points/knives have included, among others, examples of Gary, Wells, Evans, Elam, Sinner, Ellis, Delhi, Marshall, and Palmillas points. These lithic projectile points/knives are characteristically shorter and narrower than those found at other Poverty Point sites.

Bayou Rivage and Rabbit Island phase sites apparently represent geographically distinct examples of Poverty Point Culture in south central Louisiana. While Gibson (1975) dates the Bayou Rivage phase from ca. 1500 - 650 BC, no dates have been suggested for the Rabbit Island phase. Additional research is required to provide solid chronological information, and to reach conclusions about the relationship between the two phases. In the original publication of *Louisiana's Comprehensive Archaeological Plan*, 15 Poverty Point sites/components were documented in Management Unit III (Smith et al. 1983); nearly one half of these sites (n=7) are located in Iberia Parish.

Woodland Stage (ca. 500 BC - AD 1000)

Despite the many innovations introduced during the Poverty Point cultural period, it is portrayed frequently as either a Late Archaic Period culture or as a pre-Woodland transitional manifestation. The Woodland Stage in Louisiana is a formative one that is characterized by a combination of itinerant and possibly sedentary agriculture, the introduction of the bow and arrow, and the widespread use of ceramics. The Woodland Stage includes three periods: Early Woodland, Middle Woodland, and Late Woodland. The Early Woodland (ca. 500 BC - AD 300) is represented by the Tchefuncte Culture, the Middle Woodland (ca. AD 1 - 400) is associated with the Marksville Culture and to a lessor extent the Troyville Culture, and the Late Woodland (ca. AD 400 - 1200) originated with the Troyville Culture but is dominated by the Coles Creek Culture. In most parts of the region, the Woodland Stage was eclipsed by the Plaquemine Culture (i.e., the florescence of the Mississippian Stage).

Tchefuncte Culture (ca. 500 BC - AD 300)

Tchefuncte Culture is characterized by the first widespread use of pottery, although within the context of a Late Archaic-like hunting and gathering tradition that maintained a Late Archaic-like tool inventory (Byrd 1994; Neuman 1984; Shenkel 1981:23). The culture first was identified at the type site (16ST1) located on the north shore of Lake Pontchartrain in southeast Louisiana (Ford and Quimby 1945; Weinstein and Rivet 1978). Later, the Tchefuncte Culture was defined by Ford and Quimby (1945) based on Works Progress Administration (WPA) excavations at Big Oak Island (16OR6) and Little Woods Midden (16OR1-5), situated on the southeastern edge of the lake in Orleans Parish.

Originally, Tchefuncte Culture was thought to be a local adaptation by an indigenous populace to the southwest Louisiana coast and to the central portion of the Vermilion River in south-central Louisiana. Since that time, however, Tchefuncte or Tchefuncte-like ceramics have been found in southeast Missouri, northwest Mississippi, the Yazoo Basin, coastal Alabama, and east Texas (Brookes and Taylor 1986:23-27; Mainfort 1986:54; Neuman 1984; Webb et al. 1969:32-35; Weinstein 1986:102). In coastal Louisiana, five phases have been designated for the Tchefuncte Period. From west to east, these are the Sabine Lake phase bordering Sabine Lake in southeast Texas and southwest Louisiana; the Grand Lake phase in the Grand Lake and Vermilion Bay area; the Lafayette phase on the west side of the Atchafalaya basin (west of the Vermilion River); the Beau Mire phase below Baton Rouge in the Ascension Parish area; and the Pontchartrain phase encompassing Lake Maurepas and Lake Pontchartrain in the Pontchartrain Basin (Weinstein 1986:108). Within the coastal

region situated adjacent to the currently proposed project area, only two phases (Grand Lake and Lafayette) have been documented.

For the purpose of this review, a date range extending from ca. 500 BC to AD 300 for the Tchefuncte Culture will be used; however, research suggests that dates for the Tchefuncte differ quite widely from region to region and occasionally within the same region (Webb et al. 1969:96; Weinstein 1986). Most scholars agree that Tchefuncte dates from as early as 700 BC in the south and that it diffuses to the north, where it is known as Tchula Culture, and terminates sometime around AD 100 (Gibson and Shenkel 1988:14; Perrault and Weinstein 1994:48-49; Shenkel 1974:47; Toth 1988:19). There is, however, evidence supportive of coastal Tchefuncte sites that were in existence until ca. AD 300 (Byrd 1994:23; Neuman 1984:135). If these dates are correct, it implies that the last remaining coastal Tchefuncte communities were coeval with Marksville Culture (Toth 1988:27-28).

Tchefuncte ceramics usually are characterized by a soft, chalky paste and a laminated appearance. They were fired at a low temperature and tempered with either sand or clay (Phillips 1970). Vessel forms consist of bowls, cylindrical and shouldered jars, and globular pots that sometimes exhibit podal supports. Many vessels are plain; however, some are decorated with punctations, incisions, simple stamping, drag and jab, and rocker stamping. Punctated types usually are more numerous than stamped types, but parallel and zoned banding, stippled triangles, chevrons, and nested diamonds also represent popular motifs. During the later portion of the Tchefuncte Period, red filming also was used to decorate some vessels (Perrault and Weinstein 1994:46-47; Speaker et al. 1986:38; Phillips 1970).

For the most part, the stone and bone tool subassemblages remained nearly unchanged from the preceding Poverty Point Culture. Stone tools included boat stones, grooved plummets, chipped celts, and sandstone saws; bone tools included awls, fish hooks, socketed antler points, and ornaments. In addition, some tools such as chisels, containers, punches, and ornamental artifacts were manufactured from shell. Projectile points/knives characteristic of Tchefuncte Culture include Gary, Ellis, Delhi, Motley, Pontchartrain, Macon, and Epps (Ford and Quimby 1945; Smith et al. 1983:163). Bone and antler artifacts, such as points, hooks, awls, and handles, also became increasingly common during this period.

Tchefuncte sites generally are classified either as coastal middens, inland villages, or hamlets. Settlement usually occurred along the slackwater environments of slow, secondary streams that drained bottomlands, floodplain lakes, and littoral zones (Neuman 1984; Toth 1988:21-23). Tchefuncte burials and artifacts suggest an egalitarian social organization. The population probably operated at the band level, with as many as 25 to 50 individuals per band. The widespread distribution of similar ceramic types and motifs implies a patrilocal residence with exogamous band marriage (Speaker et al. 1986:39). Social organization probably remained focused within macrobands, and hunting, gathering, and fishing remained integral to the Tchefuncte lifestyle. Shell midden sites and their associated faunal remains are well known for Tchefuncte Culture and document the wide variety of food resources utilized during this period. Recovered faunal remains include deer, opossum, muskrat, raccoon, otter, bear, fox, dog, ocelot, wildcat, alligator, bird, fish, shellfish (freshwater and marine), and turtle (aquatic and terrestrial). Recovered plant remains (all non-domesticated) include squash, gourds, plums, nuts, grapes, and persimmons (Neuman 1984; Smith et al. 1983). Neuman (1984) notes that the remains of crustaceans such as crabs, shrimp, and crawfish do not appear within the Tchefuncte middens. The absence of such readily available food sources probably reflects their relatively low caloric value.

Examination of faunal and floral remains from Morton Shell Mound (16IB3), a coastal Tchefuncte shell midden in Iberia Parish, suggests that some coastal sites were occupied on a seasonal basis, usually in the summer and autumn, and possibly during the spring (Byrd 1994:103). However, McGimsey (1997:11) notes that year round occupations have been demonstrated for coastal sites and also was possible at a majority of the riverine sites in Managment Unit III (Byrd 1974; Neuman 1984: 122). The preponderance of freshwater fish remains at coastal southeastern Louisiana sites such as Big Oak Island (16OR6) and Little Oak Island (16OR7) indicates a reliance on aquatic resources (Shenkel and Gibson 1974). As of 1983, the original publi-

cation date for *Louisiana's Comprehensive Archaeological Plan*, 37 Tchefuncte Period sites or components had been documented in Management Unit III (Smith et al. 1983). Only four of these sites/components were located in Iberia Parish.

Marksville Culture (ca. AD 1 - 400)

Marksville Culture, named for the Marksville site (16AV1) in Avoyelles Parish, often is viewed as a localized version of the elaborate midwestern Hopewell Culture, the traits of which filtered down the Mississippi River from Illinois (Toth 1988:29-73). That the Marksville Culture possessed more highly organized social structure than their Tchefuncte predecessors is implied by the complex geometric earthworks, conical burial mounds for the elite, and unique mortuary ritual systems that characterize Marksville. Some items, such as intricately decorated ceramic vessels, were manufactured primarily for inclusion in burials. Burial items also frequently consisted of pearl beads, carved stone effigy pipes, copper ear spools, copper tubes, galena beads, and carved coal objects. Toward the end of the Marksville Period, however, Hopewellian influences declined, and mortuary practices became less complex (Smith et al. 1983; Speaker et al. 1986).

Ceramic decorative motifs such as cross-hatching, U-shaped incised lines, zoned dentate rocker stamping, cord-wrapped stick impressions, stylized birds, and bisected circles were shared by Marksville and Hopewell Cultures (Toth 1988:45-50). Additional Marksville traits include a chipped stone assemblage of knives, scrapers, celts, drills, ground stone atlatl weights and plummets, bone awls and fishhooks, baked clay balls, and medium to large stemmed projectile points dominated by the Gary type.

A variety of exotic artifacts commonly found at Marksville sites suggests extensive trade networks and possibly a ranked, non-egalitarian society. Some commonly recovered exotic items include imported copper earspools, panpipes, platform pipes, figurines, and beads (Toth 1988:50-73; Neuman 1984). The utilitarian material culture remained essentially unchanged, reflecting an overall continuity in subsistence systems (Toth 1988:211).

Marksville peoples probably used a hunting, fishing, and gathering subsistence strategy much like those adopted by prehistoric groups in earlier periods. Gagliano (1979) suggests that food procurement activities were a cyclical/seasonal (transhumance) activity that revolved around two or more shifting camps. In the southeastern part of the state, shellfish collecting stations on natural levees and lower terraces around Lake Pontchartrain and Lake Maurepas were occupied and utilized during the summer months. During the winter months, semi-permanent hunting/gathering camps on the prairie terrace were occupied. This subsistence technique reflects the fission and fusion that probably originated during the Archaic Stage.

There may also have been an increased focus on the use of oily seeds (marsh elder, sunflower, curcurbits) and starchy seeds (chenopodium, wild bean, maygrass, knotweed, little barley) (Fritz and Kidder 1993:7; Smith 1986:51). At the Reno Brake Site (16TE93) in Tensas Parish, Kidder and Fritz (1993) recovered deer, squirrel, rabbit, bird, and fish remains as well as acorns, persimmons, palmettos, grapes, blackberries, and very minor amounts of chenopodium and sumpweed. Although maize has been identified and dated from a Middle Woodland context at sites in Tennessee and Ohio (Ford 1987), maize does not appear to have been of economic significance until much later, i.e., during Mississippian times (Fritz and Kidder 1993:7; Kidder and Fritz 1993:294; Smith 1986:50-51).

Phase distribution of the Marksville Culture has largely been made through a combination of diagnostic ceramic traits and geographic distribution. Within the general vicinity of the current proposed project area, two phases (Jefferson Island and Veazey) have been identified. These phases are found in the south central or Petite Anse region of the state, and representative sites typically are situated along the Teche-Mississippi river channel (i.e., the Jefferson saltdome). Jefferson Island phase sites, discussed by Toth (1977), date from ca. AD 1 to 200. Decorated ceramic vessel forms from this early phase exhibit curvilinear motifs, rocker stamping, and fabric impressions. The Veazey phase dates from ca. AD 200 - 400. This phase, named for the Veazey Site (16VM7) in Vermilion Parish, frequently is asso-

ciated with a scant presence of Late Marksville/Issaquena ceramic sherds that overlay Tchefuncte Period sites of the Grand Lake phase (Jeter et al. 1989; Phillips 1970). Additionally, two southwest Louisiana phases, Lacassine and Lake Arthur, apparently are contemporaries of the Jefferson Island and the Veazey phases, respectively. While the Lacassine phase has been well documented by Bonnin and Weinstein (1975 and 1978) following excavations at the multicomponent Strohe Site (16JD10), the Lake Arthur phase has been defined only poorly (Bonnin and Weinstein 1978). According to Phillips (1970), coastal sites from the latter part of the Marksville cultural period may contain Marksville Stamped *var. Troyville*, Yokena Incised, and Churupa Punctated ceramic sherds (Jeter et al. 1989).

As of 1983, the original publication date for *Louisiana's Comprehensive Archaeological Plan*, 38 Marksville sites had been documented in Management Unit III (Smith et al. 1983). While none of these sites is located in the vicinity of Marsh Island, they have been recorded in Iberia Parish (n=6).

Troyville-Coles Creek Period (ca. AD 400 - 1200)

Troyville Culture, labeled Baytown elsewhere, was named after the mostly destroyed Troyville mound group (Site 16CT7), located in Jonesville, Catahoula Parish, Louisiana (For a full discussion of the Troyville/Baytown issue, see Gibson 1984 or Belmont 1984). Troyville represents a transition from the Middle to Late Woodland Period that culminated in the Coles Creek Culture (Gibson 1984). Though distinct, these two cultures share a sufficient number of traits to cause many researchers to group them as a single prehistoric cultural unit (Belmont 1967). According to Neuman (1984:169), 23 ^{14}C dates for 14 Troyville-Coles Creek sites in Louisiana place the beginning of Troyville Culture at AD 395. In addition, Kidder (1988:57) places the beginning of the Coles Creek Culture at some time between ca. AD 700 and AD 800. The continuing developments of agriculture and the refinement of the bow and arrow during this time (reflected by Alba, Catahoula, Friley, Hayes, and Livermore projectile point types), radically altered subsequent prehistoric lifeways. During the Troyville cultural period, bean and squash agriculture may have become widespread based on the appearance of large ceramic vessels in the archeological record. This shift in subsistence practices probably fostered the development of more complex settlement patterns and social organization.

Only two Troyville phases (Whitehall and Roanoke) have been described in the coastal region of Louisiana, and these coexistent phases are separated only by their physical/geographic distance (Jeter et al. 1989). According to Phillips (1970), the Whitehall phase is used to describe the eastern portion of state. The Roanoke phase of west Louisiana was more recently defined by Bonnin and Weinstein (1978) based on information gathered during excavation of the Strohe site (16JD10).

The Late Woodland Coles Creek Culture emerged from Troyville around AD 750 and represented an era of considerable economic and social change in the Lower Mississippi Valley. By the end of the Coles Creek Period, communities became larger and more socially and politically complex, large-scale mound construction occurred, and near the end of the period, there is evidence for the resumption of long-distance trade on a scale not seen since Poverty Point times. These changes imply that a chiefdom-like society was re-emerging in the Lower Mississippi Valley (Muller 1978). The migration of material and sociopolitical concepts from the Midwest may be indicated by the fact that Coles Creek ceramics have been recovered from early Cahokian contexts dating from ca. AD 900 in southeastern Missouri (Kelly 1990:136). These changes probably initiated the transformation of Coles Creek cultural traits into what now is recognized as the Plaquemine Culture at sometime around AD 1200 (Jeter et al. 1989; Williams and Brain 1983).

Ceramics of the Troyville/Coles Creek Period are distinguished by their grog and grog/sand tempers, as opposed to the chalky, sand tempered paste of the previous ceramic series. Decorative motifs include cord marking, red filming, and simplified zoned rocker-stamping, as well as decorations with incised lines and curvilinear lines. As noted by McIntire (1958), the Coles Creek peoples continued to use the earlier Troyville wares, with only minor elaborations. For instance, the Churupa Punctated and the Mazique Incised designs, both of which are char-

acteristic of the Troyville Culture, were used by both Coles Creek and later Plaquemine pottery makers (McIntire 1958). Similarly, French Fork Incised, which formed the basis for many Troyville classifications, continued to be used well into the Coles Creek Period (Phillips 1970).

Coles Creek peoples also developed a new ceramic complex that included larger vessels and a wider range of decorative motifs, usually positioned on the upper half of the vessel (Neuman 1984). Coles Creek Incised, Beldeau Incised, and Pontchartrain Check Stamped forms characterize the period (Phillips 1970; Weinstein et al. 1979). A distinctive decorative type, Coles Creek Incised, contains a series of parallel incised lines placed perpendicular to the rim of the vessel, often accompanied underneath by a row of triangular impressions (Phillips 1970:70; Phillips et al. 1951:96-97). Several of the ceramic motifs suggest outside cultural influences. French Fork Incised motifs and decorative techniques, for example, mimic almost exactly Weeden Island Incised and Weeden Island Punctated ceramics from the northwest Florida Gulf Coast (Phillips 1970:84; Phillips et al. 1951:101; Willey 1949:411-422). Pontchartrain Check Stamped ceramics also appear at the same time as the resurgence of the check stamped ceramic tradition Weeden Island III in northwest Florida (Brown 1982:31).

Sites from the Coles Creek cultural period were situated primarily along stream systems where soil composition and fertility were favorable for agriculture. Natural levees, particularly those situated along old cutoffs and inactive channels, appear to have been the most desirable settlement locations (Neuman 1984). Most large Coles Creek sites contain one or more pyramidal mounds. Coles Creek mounds typically are larger, and exhibit more building episodes than the earlier Marksville burial mounds. Burials occasionally are recovered from Coles Creek mounds; however, the primary function of the mounds appears to have been ceremonial in nature. At some Coles Creek sites, mounds are connected by low, narrow causeways; sometimes, plazas are associated with these multiple mound sites (Gibson 1985b). The sophistication of Coles Creek mound systems suggests a more complex social structure; a centralized authority and sizable labor force must have existed to build, maintain, and utilize these mounds. The centralized authority may have been of a special religious class, while the general population occupied the region surrounding the large ceremonial centers (Gibson 1985b; Neuman 1984; Smith et al. 1983).

In general, small Coles Creek sites consist mostly of hamlets and shell middens, and they normally do not contain mounds. Coles Creek shell middens are most commonly found in the coastal region where they occupy higher portions of natural levees (Springer 1974).

Recent work has dispelled the old theory that an intensification of agriculture, particularly maize (*Zea mays* spp. *mays*) and squash (*Cucurbita pepo*), created the stable subsistence base from which the Coles Creek Culture arose and flourished. Although Coles Creek populations exhibit tooth decay rates consistent with a diet based on starchy plant foods such as maize, limited archeobotanical evidence for maize in Coles Creek midden deposits suggests that consumption of some other starchy foods must have been the cause of the dental problems experienced by Coles Creek peoples (Kidder 1992; Steponaitis 1986). While researchers speculate that the use of cultigens, especially squash species, as a dietary supplement occurred in conjunction with the incipient Coles Creek Culture, evidence of dependence on domesticated plants has been lacking at early Coles Creek sites (Kidder and Fritz 1993; Kidder 1992). The preponderance of evidence now available indicates that cultivation and consumption of maize was not widespread in the Lower Mississippi Valley until after the Coles Creek Period, ca. AD 1200 (Kidder 1992:26; Kidder and Fritz 1993). Thus, while maize existed during the Coles Creek Period, its cultivation was not the subsistence basis of the society.

Some sites in the Petit Anse region, e.g. the Morgan Site (16VM9), have produced limited amounts of wild plant species (Brown 1981; Fuller and Fuller 1987); however, subsistence in the coastal region of Louisiana apparently was based on the exploitation of available aquatic and/or terrestrial animal resources. Excavations by Goodwin (1986) at Site 16CM61, a *Rangia* shell midden in the western part of the state, indicated patterns of seasonal exploitation for both marine mollusks and fish. Additionally, at the Pierre Clement Site (16CM47) in Cameron Parish, Springer (1979) documented a variety of faunal material including mammals, avians, reptiles,

and fish that originated from a Coles Creek component.

Earlier assumptions about the nature and extent of social and political differentiation during the Coles Creek Period also must be reexamined. Square-sided, flat-topped mounds believed to serve as platform bases for elite structures appear first in the area during the Coles Creek Period. However, evidence for the elite residential or mortuary structures often said to be associated with Coles Creek mounds remains elusive prior to AD 1000 (Kidder and Fritz 1993; Smith 1986; Steponaitis 1986). Both the form of the platform mounds and their arrangement around plazas possibly is indicative of Mesoamerican influence (Willey and Phillips 1958; Williams and Brain 1983).

In the central and western areas of coastal Louisiana, early, middle, and late (transitional) phases have been defined both for the Coles Creek and the transitional Coles Creek cultural periods (Brown 1984; Weinstein 1979 and 1986:108; Ryan et al. 1996:Figure 3; Jeter et al. 1989). In the Petite Anse region, these include the White Lake phase (ca. AD 700 - 900); the Morgan phase (ca. AD 900 - 1000); and the Three Bayou phase (ca. AD 1000 - 1200). The Coles Creek phases of southwest Louisiana are nearly contemporaneous, and consist of the Welsh (ca. AD 700 - 850), Jeff Davis (ca. 850 - 1000), and Holly Beach phases (ca. AD 1000 - 1200).

Louisiana's Comprehensive Archaeological Plan documents 196 sites with Troyville-Coles Creek components within Management Unit III (Smith et al. 1983). The majority of these sites lie along the coastal plain. By 1983, only 27 Troyville-Coles Creek sites had been recorded in Iberia Parish. One of these sites, 16IB14, was recorded on Marsh Island by McIntire (1954) during his extensive examination of coastal Louisiana. Site 16IB14 later was re-identified by Brown (1979). This site is located on a shell reef at the terminus of Oyster Bayou and in excess of 8 km (5 mi) from the closest project item (Canal 8) associated with the current assessment.

Mississippian Period (ca. AD 1200 - 1700)

The Mississippian Stage represents a cultural climax in population growth and social and political organization for those cultures occupying the southeastern United States (Phillips 1970; Williams and Brain 1983). In the Lower Mississippi Valley, the advent of the Mississippian Stage is represented at sites in the valley and along the northern Gulf Coast by incorporation of traits such as shell tempered ceramics, triangular arrow points, copper-sheathed wooden earspools, and maize/beans/squash agriculture (Williams and Brain 1983). Formalized site plans consisting of large sub-structure "temple mounds" and plazas have been noted throughout the Southeast at such places as Winterville, Transylvania, Natchez, Moundville, Bottle Creek, and Etowah (Hudson 1978; Knight 1984; Walthall 1980; Williams and Brain 1983). In the coastal region of Louisiana, the Mississippian Culture stage is characterized by both the Plaquemine or Emergent Mississippian Period (AD 1200 - 1450) and by the Late Mississippian Period (AD 1450 - 1700). However, it is likely that in some parts of the region either Plaquemine Culture or a hybrid of that culture was in existence until European contact (Jeter et al. 1989).

Within Management Unit III, *Louisiana's Comprehensive Archaeological Plan* (Smith et al. 1983:63) reports 83 sites from the Plaquemine (Emergent Mississippian) Period, but only 13 from the Late Mississippian Period. Of these 96 sites, a total of 24 (17 Plaquemine and seven Mississippian sites) have been recorded in Iberia Parish. While none of these Mississippian sites is located within the general vicinity of the current project undertaking on Marsh Island, according to an attachment to the 1979 site form, the aforementioned Coles Creek site (16IB52) may contain a Plaquemine cultural component; it will be discussed in Chapter V.

Emergent Mississippian Period (AD 1200 - 1450/1700)

The Emergent Mississippian Period Plaquemine Culture appears to represent a transitional phase from the Coles Creek Culture to a pure Mississippian Culture (Kidder 1988). Interaction with the emerging Mississippian cultures of the Middle Mississippi Valley probably exerted enough influence during the latter part of the Coles Creek Period to initiate the cultural change that eventually became the Plaquemine Culture. The Medora Site (16WBR1), described by Quimby (1951) and considered to be the type site, typifies Plaquemine Culture. Plaquemine

peoples continued the settlement patterns, economic organization, and religious practices established during the Coles Creek Period; however, agriculture, sociopolitical structure, and religious ceremonialism intensified, suggesting a complex social hierarchy. Sites typically are characterized either as ceremonial sites, with multiple mounds surrounding a central plaza, or as dispersed villages and hamlets (Neuman 1984; Smith et al. 1983).

Plaquemine lithic assemblages are quite similar to those of the preceding Troyville-Coles Creek cultural complex and they are dominated by the same small projectile point styles (Smith et al. 1983). In addition, Plaquemine ceramics are derived from the Coles Creek tradition; however, they display distinctive features that mark the emergence of a new cultural tradition. In addition to incising and punctuating their ceramics, Plaquemine craftsmen also brushed and engraved decorations on their vessels (Phillips 1970). Plaquemine Brushed appears to have been the most widespread ceramic type. Other Plaquemine ceramic types included Leland Incised, Hardy Incised, L'Eau Noire Incised, Anna Burnished Plain, and Addis Plain.

In the past, the cultural achievements of the Plaquemine Period were thought to have been supported by the intensive cultivation of maize. During the early part of this period, subsistence may have shifted to agriculture that was supplemented by native plants and animals; however, evidence of intensive agriculture has been inconclusive (Kidder and Fritz 1993:9).

Gregory (1969) indicates that Plaquemine site locations demonstrate a propensity towards lowland areas including swamps and marshes. Neuman (1984), however, cites Hall's observation that Plaquemine Culture sites in the upper Tensas basin were located most frequently on well-drained natural levees characterized by sandy soils. In general, coastal sites tend to be smaller and less elaborate; it is suggested that coastal shell middens are a product of early Plaquemine activities (Davis et al. 1979; Brown et al. 1979). The presence of these sites may indicate the persistence of seasonal food procurement strategies and they probably are related to continued transhumance activities. By ca. AD 1450, Kidder (1988) asserts that the Plaquemine Culture had evolved into a true Mississippian Culture.

In the Petit Anse region of south Louisiana, Brown (1985) contends that coastal Plaquemine populations descended from incipient Coles Creek peoples, and there is ample evidence of continuance from this preceding culture (e.g., Phillips 1970; Hally 1972; Jeter et al. 1989). Under this scheme, the transitional Coles Creek Three Bayou phase (ca. AD 1000 - 1200) is supplanted by the ensuing Burk Hill phase (ca. AD 1200 - 1600). This phase includes sites along Vermilion Bay, and around the Salt Dome Islands (Brown 1985). In southwest Louisiana, the Bayou Chene phase (ca. AD 1200 - 1700) has been explained by Weinstein (1985) as a localized expression of Plaquemine/Mississippian development. The Bayou Chene phase is based on the interaction of Transitional Coles Creek/ Plaquemine peoples with those of a more localized tradition that likely originated as a result of migrations or diffusion from southeast Texas.

Late Mississippian Period (AD 1450 - 1700)

During this time, several traits that are now definitive of the Mississippian Period were widespread across most of the Southeast. These diagnostic traits include well-designed mound groups, a wide distribution of sites and trade networks, shell tempered ceramics, and a revival in ceremonial burial of the dead (Griffin 1990:7-9). In coastal Louisiana, Late Mississippian Culture probably is related to the Pensacola variant. It is Knight's (1984) contention that displaced Mississippian populations from the central Gulf Coast, i.e., the Mobile Bay area and the Alabama/Tombigbee river systems, resettled in coastal Louisiana. Additionally, Brown and Brown (1978) have recovered Yazoo River Basin-like pottery from Avery Island, one of the saltdomes in the Petit Anse region.

Mississippian subsistence was based on the cultivation of maize, beans, squash, and pumpkins; collection of local plants, nuts, and seeds; and fishing and hunting of local species. Major Mississippian sites were located on fertile bottomlands of major river valleys; sandy and light loam soils usually composed these bottomlands. A typical Mississippian settlement consisted of an orderly arrangement of village houses surrounding a truncated pyramidal mound. These mounds served as platforms for temples or as elite residences. A highly organized and complex social

system undoubtedly existed to plan these intricate communities.

Ceramic types frequently were characterized by shell tempering, an innovation that enabled potters to create larger vessels (Brain 1971; Steponaitis 1983). Ceramic vessels included such forms as globular jars, plates, bottles, pots, and salt pans. The loop handle has been noted on many Mississippian vessels. Although utilitarian plainware was common, decorative techniques included engraving, negative painting, and incising; modelled animal heads and anthropomorphic images also adorned ceramic vessels. Other Mississippian artifacts included chipped and groundstone tools; shell items such as hairpins, beads, and gorgets; and mica and copper items. Chipped and ground stone tools and projectile point styles such as Alba and Bassett also were common.

Mississippian Culture had a weak presence in south central and southwestern Louisiana, and only two Mississippian or Mississippian-like phases have been recognized. The first, Petite Anse (ca. AD 1600 - 1700), has been used to describe Mississippian peoples/traders from the lower Yazoo River basin who traveled to the Petit Anse region (Avery Island) to procure salt (Brown and Brown 1978). The second, in southwest Louisiana, is the Little Pecan phase (ca. AD 1650/1700 - 1750); it is associated with the historic Attakapa, and represents a synthesis of ceramic types that originate from the Lower Mississippi Valley, Louisiana, and from Texas (Jeter et al. 1989; Frank 1976).

Protohistoric and Early Historic Period (AD 1500 - 1800)

An understanding of protohistoric and historic Native American cultures of the southeastern United States is severely limited by our frequent inability to recognize the ancestral cultures from which these groups were derived. This is due partially to the waning influence of Mississippian Culture, but primarily is a result of the social disruption initiated by the legacy of the de Soto entrada of 1539 - 1543, and the subsequent French and Spanish exploration and colonization throughout the Southeast. These interactions necessitated a major social/demographic reorganization. Native American population upheaval and depletions were related to warfare, disruptive migrations, and epidemics introduced by European contact (Davis 1984; Smith 1989). Information on protohistoric and historic populations, gleaned only in part from the archeological record, derives predominately from early European chroniclers, the historical record, and later ethnographic accounts of this tumultuous era.

According to *Louisiana's Comprehensive Archaeological Plan* (Smith et al. 1983), only two Native American groups (Attakapa and Opelousa) occupied Management Unit III at the time of European contact; however, Swanton (1946) also reported the presence of the Chitimacha in this region. Little is known of the Opelousa who were decimated by European disease between 1715 and 1804, however, Swanton (1946) states that they probably were members of the Attakapan linguistic family. The second group was the Attakapa, a Choctaw and Mobilian phrase for "man eater" or "eaters of human flesh". While no acts of their reported cannibalism have ever been documented, this information may have been taken from a French officer, Simars de Delle-Isle, who was stranded on the Louisiana coast in 1719 (Post 1962). The Attakapa are known to have consisted of three or more groups that lived on the Calcasieu, Mermentau, and Vermilion Rivers of Louisiana but extended as far west as the Trinity River in Texas (Swanton 1946; Aten 1983).

Convention holds that as the influence of Mississippian Culture declined throughout the Southeast, populations along the northern Gulf Coast reverted to egalitarian societies and readopted the localized/regional hunting and gathering subsistence strategies that had been successful throughout the Archaic and Woodland Stages (Peebles and Kus 1977; Peebles and Mann 1983). These strategies frequently were augmented by either itinerant horticulture or small-scale agriculture that produced corn, beans, and squash. Both archeological and ethnographic evidence indicates that the historic Attakapa lived an Archaic stage-like existence of fishing, hunting, and plant gathering.

The historical record indicates that the Attakapa interacted both with the French and the Spanish, and Swanton (1946) reports that in 1779, they allied against the British and supplied both men and supplies to Galvez for the purpose of attacking forts on the Mississippi River. Disease

and disruptive migrations due to colonial expansion and to the change in ownership of the regions from France to Spain and subsequently to the United States accounted for the disintegration of aboriginal populations in the area. Subsequently, only about 80 Attakapa warriors inhabited south Louisiana in 1805 (Swanton 1946).

The Chitimacha, members of the Tunica linguistic family, also are known to have inhabited both Bayou Teche and the Atchafalaya Basin at the time of French exploration (Swanton 1946; Usher 1989). During this period, they controlled much of the upper Barataria Basin along both Bayou Lafourche and the Mississippi River. Following unfavorable interactions with first European and then American colonists beginning as early as AD 1702, much of the Chitimacha population eventually was dispersed to inaccessible locations throughout the coastal region of the state. The Chitimacha continue to reside along Bayou Teche near present-day Charenton, Louisiana.

Underwater Prehistoric Overview

The potential for submerged prehistoric resources in the project area is dependent in large part upon the geomorphology of the area. Sea level at 12,000 BP, the commonly accepted date for the emergence of humans in the Gulf of Mexico region, was approximately 60 m (196.6 ft) below present sea level. The continental shelf shoreward of the 60 m (196.6 ft) bathymetric contour, including the entire project area, generally is therefore considered to have the potential to hold prehistoric sites. This "high potential zone" may be further subdivided, with specific geomorphological features having a much higher probability of associated prehistoric features. Relict geomorphic features that have the potential to contain prehistoric sites include tidal estuaries, embayments, barrier islands, beach ridge sequences, spits, alluvial terraces, and stream channels. Remote sensing surveys that utilize a subbottom profiler may identify such geomorphological features, since a profiler can penetrate to more recent bottom sediments to reveal the earlier features (Minerals Management Service 1995a, 1995b; Coastal Environments 1977).

Often, however, ravinement and postdepositional erosion processes on earlier deltaic complexes will have disturbed or destroyed many of the deposits that have the potential to hold prehistoric cultural resources. Submerged terrestrial sites were not a high priority for this survey, as the disposal of dredged material over the already deeply buried relict features is unlikely to have a negative impact upon such resources. In addition, recent work in the area with subbottom profiling equipment has resulted in little or no acoustic penetration of the bottom sediments, thereby nullifying the instrument's effectiveness. The lack of penetration is due to the presence of biogenic gases such as methane and carbon dioxide (products of decaying organic matter), as well as elevated levels of trapped water in the bottom sediments (Behrens, Samson, and Seidel 1997:7).

Subsequent to the rise to current sea level, during both the prehistoric and early historic periods, settlement within the Atchafalaya Basin as a whole was sparse. The swampy nature of the Basin, with limited amounts of dry ground, precluded long term settlement for much of the prehistoric period. The high ridges along the coastline were more likely to have seen habitation than many of the inland areas, and exploitation of coastal and estuarine resources undoubtedly occurred (Pearson and Saltus 1991). Much of the movement of prehistoric peoples through the area was by necessity accomplished on the water, and dugout canoes were the prevalent mode of water transportation before and immediately after initial European contact in the region. Canoes generally were constructed from a single cypress log and often attained lengths of over 9 m (30 ft) (Pearson et al. 1989). These small craft must have been lost occasionally, both along the coast and on inland waterways. Discovery of such remains during this survey was considered unlikely due to their nature and the survey methodology utilized. Lacking ferrous fasteners or hardware, dugout canoes were unlikely to be detected by a magnetometer, and would be detected by side scan sonar only if bottom sediments were in the process of erosion or deflation, neither of which were observed within the project area.

CHAPTER IV

HISTORIC OVERVIEW

Introduction

The currently proposed project items are located in coastal Iberia Parish, Louisiana, along the easternmost portion of Marsh Island, an area traversed by several pipeline canals, as well as natural bayous and lakes. This area is situated entirely within Township 17S, Range 7E, and it is bounded west and south by Bayou Blanc, south and east by East Cote Blanche Bay, and north by West Cote Blanche Bay. Historically, this region was utilized primarily for trapping and fishing, today, however, pipelines and other petroleum facilities extend across its marshes and waterways. This chapter presents a general overview of the history of the project vicinity, with an emphasis on land usage on Marsh Island.

Colonial through Antebellum Eras

During the French and Spanish colonial periods, present-day Iberia Parish was included in that part of the Louisiana colony called the Attakapas region, or district, so-named for one of the Native American tribes indigenous to the area. French trappers were joined in the Attakapas region by Acadians, many from the Chignecto Isthmus of Nova Scotia, and Málagans, emigrants from the Costa del Sol in southern Spain (Bergerie 1962:3-11; Brasseaux 1987:91-98, 122; Davis 1971:131). Although settlement increased in the Attakapas region, particularly under the Spanish regime, there is no evidence of any development of Marsh Island during that time period; however, records do indicate colonial knowledge of the existence of the island. An unidentified island corresponding to the general location of Marsh Island was depicted on a French map in 1760 (Figure 10). In addition, at least one shipwreck dating from the late eighteenth century has been documented off the coast of the island (Birchett et al. 1998:4-11).

As part of the negotiations leading to the 1803 Louisiana Purchase, Spain restored western Louisiana to France, which shortly thereafter conveyed the Louisiana Territory to the United States. On March 26, 1804, that portion of the Louisiana Purchase located below the thirty-third parallel was designated the Territory of Orleans. The following year, Orleans was partitioned into 12 counties, including the county of Attakapas, which encompassed the present-day parishes of Iberia, St. Mary, and Vermilion, most of Lafayette and St. Martin, and portions of Cameron and Iberville. In 1807, the territorial legislature reorganized the county system, further dividing the Territory of Orleans into 19 parishes. Attakapas County was superseded by the parish of St. Martin, which encompassed roughly the same territory as its predecessor. Originally (1807 – 1811), St. Martin Parish was bounded to the northwest by St. Landry Parish, to the southeast by Lafourche Parish, to the south by the Gulf of Mexico, and to the northeast by the western Mississippi River parishes of Baton Rouge, Iberville, Ascension, and Assumption. In 1811, however, southeastern St. Martin Parish was re-designated St. Mary Parish, which included Marsh Island and part of what would later become southern Iberia Parish. The following year, on April 30, 1812, the State of Louisiana was admitted to the Union (Figure 11) (Bergerie 1962:14-15; Davis 1971:157-164, 167-169, 176; Goins and Caldwell 1995:41-42).

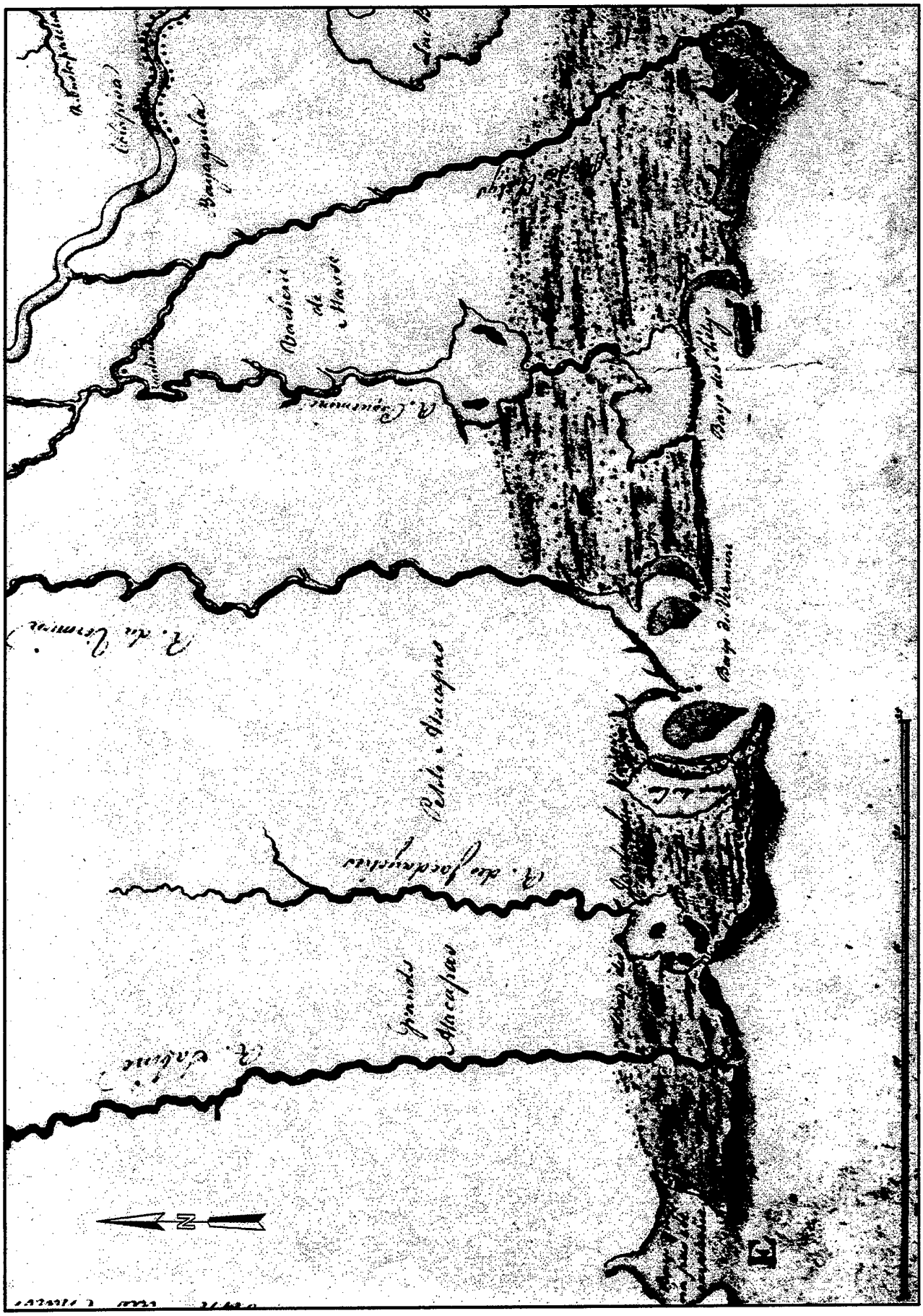


Figure 10. **[1760] Excerpt from an untitled map of Louisiana, in reference to the project vicinity. Excerpt depicts the Atacapas [Attakapas] region and an unidentified island located in Baye du Vermion [Vermilion Bay] and south of R. du Vermion [Vermilion River], i.e., in the general vicinity of present-day Marsh Island.**

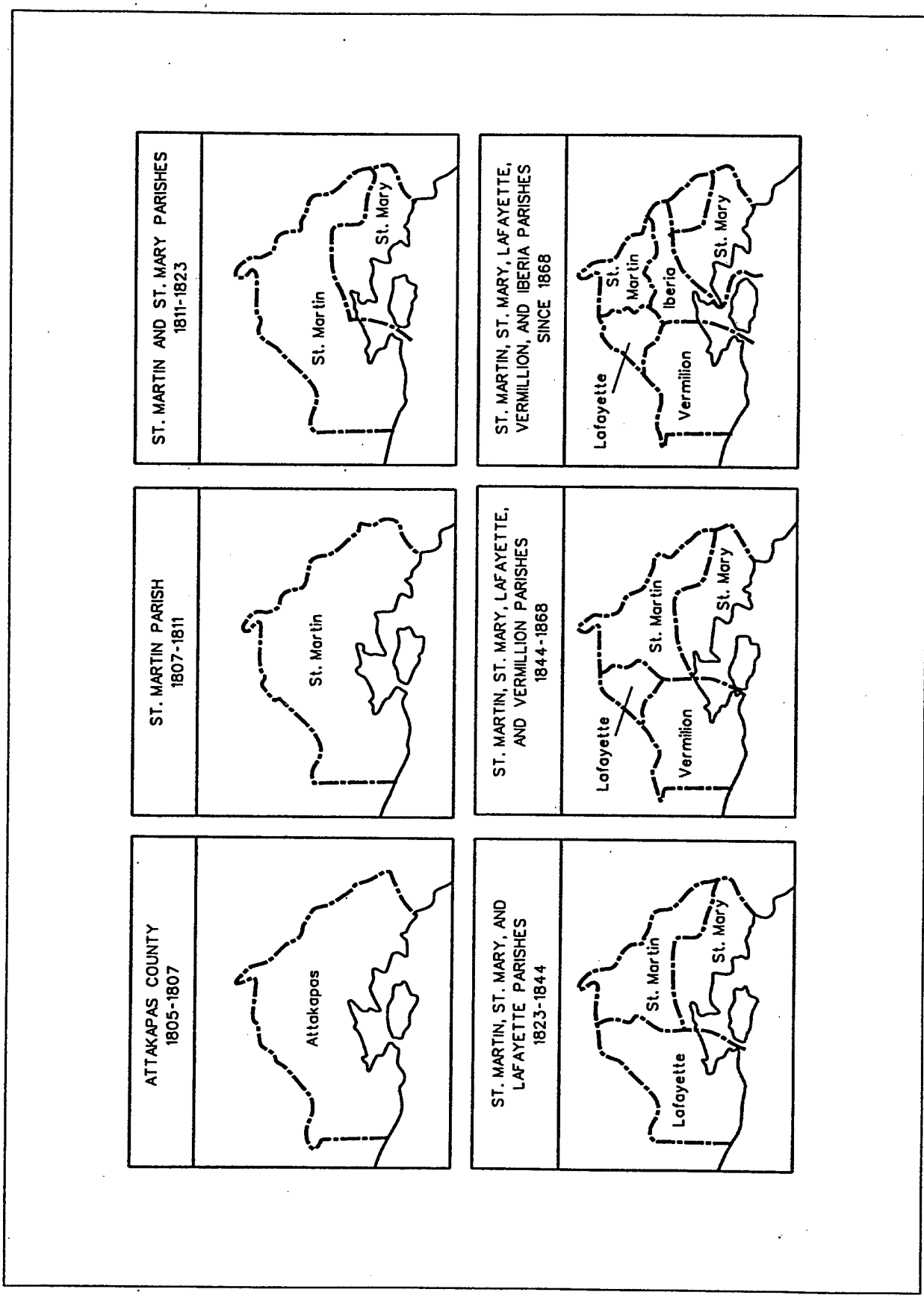


Figure 11. Divisions of the original Attakapas County, or St. Martin Parish, 1805 - 1868, derived from St. Martin Parish Development Board ca. 1950.

According to examined sources, Marsh Island continued to remain uninhabited throughout the antebellum era. At least two explorations of the area, however, were completed during this time period. The first occurred in 1815 when the United States government established a construction and repair agenda to address the naval shortcomings exposed during the War of 1812. As part of this program, timber surveys were ordered in 1818 through southern Louisiana and Alabama under the leadership of James Leander Cathcart and James Hutton, with John Landreth as surveyor (Prichard et al. 1945:735-736). According to the journal kept by Cathcart, the original strategy of the expedition was designed:

> To explore Belle Isle, & pass out between Point au Fer, & Point Chevreuil, or through Morrisons Cut, & coast Vermillion bay as far as Chenier au Tigre, & from thence in the Gulf of Mexico, to the entrance of the Mermentau river, up the said as far as live oak grows, & from thence to New Orleans by the best rout. . . [sic throughout] (Prichard et al. 1945:765).

This route would have taken the survey party in a northwestward direction from southeastern St. Mary Parish, past Marsh Island, to the division between St. Martin and St. Landry Parishes (today, a point mid-way along coastal Cameron Parish) (Figure 12).

After exploring the mouth of the Atchafalaya River, however, the venture into the Attakapas country was abandoned due to "the risks of the day, & finding that our boat was not sufficiently large to carry so many men, & provisions along the sea coast, to explore Cheniere au Tigre, & to the Mermentau river" (Prichard et al. 1945:811). It was "unanimously declared, that the boat was not trustworthy," and additionally, the expedition members were warned by their pilot that:

> . . . if we lost our boat, & even got safe ashore, we must inevitably perish, either by the hands of Indian hunters, pirates, or smugglers, which infest this coast, or from wild beasts, the Panther or Tiger, being numerous, that we could not cross the innumerable swamps & Bayous which intersect this Country, & would die of hunger, before we could get to any habitation, even if we escaped the other dangers . . . (Prichard et al. 1945:811).

After considering these "disagreeable circumstances," the surveyors determined that an inland survey of the timberlands between the Vermilion and Mermentau Rivers would be a wiser course of action (Prichard et al. 1945:811). From these vivid journal entries, it may be concluded that in 1818 the environs of Vermilion Bay, including Marsh Island, probably were uninhabited, not to mention inhospitable. It has been suggested, however, that the reports of danger lurking in southwestern Louisiana may have been exaggerated in order to discourage Federal representatives from scrutinizing certain lawless activities too closely (Prichard et al. 1945:811, 826-827).

Nearly 20 years after the Cathcart expedition (1837-1838), a government-ordered topographic survey of eastern Marsh Island, i.e., Township 17S, Range 7E, of the South Western District, was conducted (Figure 13); however, it was not approved conclusively by the General Land Office for over two decades. In late 1842, the Louisiana Surveyor General remonstrated that the field survey was incomplete. On June 13, 1859, the General Land Office declared that "the exception taken to it by the former Sur. Genl. under date of Decr. 23 - 1842 is removed and sales may now be passed" (Louisiana Surveyor General 1859). It may be presumed, then, that that portion of Marsh Island probably, or at least officially, remained vacant property until after June 13, 1859. There certainly may have been trappers or squatters on the island prior to that time; however, research revealed no evidence of the antebellum occupation of easternmost Marsh Island.

By 1853, a lighthouse had been constructed at the westernmost tip of Marsh Island, across Southwest Pass from Cheniere au Tigre in southeastern Vermilion Parish (Figure 12). During the early to mid-nineteenth century, Marsh Island also was known as Belle Island, or Isle Bella, and even as Grand Island or Isle, probably because Southwest Pass formerly was called Grand Pass. In researching historical maps and other references, care should be taken not to confuse these early names with Belle Isle and Grand Isle, both of which are located to the southeast of Marsh Island in modern-day St. Mary and Jefferson Parishes, respectively (Baldwin & Cradock 1833; Lange 1854; Mitchell 1845, 1860).

Figure 12. **[1853] Excerpts from Bayley's New and Improved Map of Louisiana, in reference to the project vicinity. Excerpts depict coastal points and waterways surrounding Marsh Island and the lighthouse constructed on the western tip of Marsh Island.**

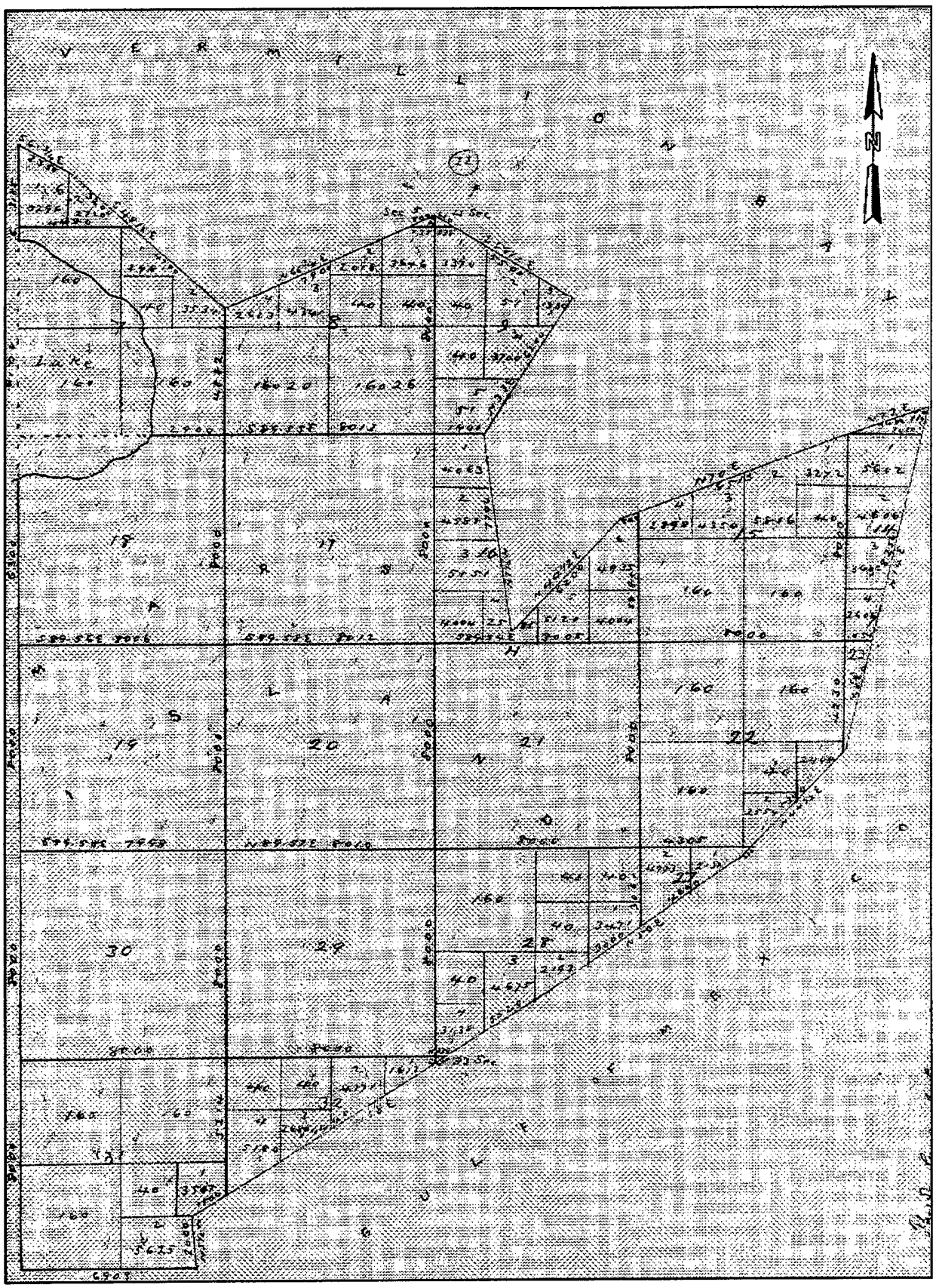


Figure 13. **[1859] Reduced excerpt from the Louisiana Surveyor General's approved survey of Township 17S, Range 7E, in reference to the project vicinity. Excerpt depicts the easternmost portion of Marsh Island.**

The Civil War

The Civil War had only an indirect impact on the project area. After New Orleans and Baton Rouge fell in 1862, military operations in Louisiana were focused along Bayou Teche and along the Mississippi and Red Rivers, all inland and well away from Marsh Island. While there is no evidence of military activity occurring on Marsh Island, its position southwest of Bayou Teche and south of salt-rich Petite Anse (now Avery) Island probably exposed its coastline to transient military movements through the surrounding bays (Figures 14 and 15).

The Teche Campaign (spring of 1863) was planned as part of the Federal grand strategy to split the Confederacy by gaining control of the lower Mississippi River. Union command of the western tributaries of the Mississippi River was considered necessary to the success of this objective. Additionally, Federal occupation of the Teche country would help terminate the southwestern Louisiana supply line connecting Texas and the Attakapas region to Confederate forces east of the Mississippi River (Figure 16) (Raphael 1976:54; Winters 1963:221-241).

An offshoot of the Teche Campaign was the Federal destruction of the Avery Salt Works on Petite Anse Island, across Vermilion Bay and north of Marsh Island (Figure 15). Salt was of primary importance to the Confederacy – although used as a seasoning and a chemical agent, it was vital for preserving meat, for maintaining healthy livestock, and for tanning leather. With the fall of New Orleans and the coastal blockade of Louisiana, the South lost its chief port for salt shipped from England, its major supplier (Lonn 1933:13-18; Raphael 1976:54). Southerners became so desperate for a meat preservative that "They were collecting salt by going into smokehouses and taking the drippings from the sides of pig and beef, using the dirt that absorbed those drippings and mixing it with water to put on the meat" (Schweid 1980:60).

Brine springs had been discovered on Petite Anse Island during the previous century, ca. 1790 – 1791, by John Hayes, an early settler of the island (Native American use of the springs apparently ended prior to historic discovery). Salt production first began strictly as a household operation – buckets of briny water were boiled down for the salt residue. During the War of 1812, property holder John Craig Marsh constructed a salt extraction plant near the springs; however, it never was exploited fully and it was shut down shortly thereafter. The outbreak of the Civil War motivated subsequent landowner Judge Daniel D. Avery (son-in-law of John Marsh) to revive the salt operation to help support the Confederate cause. On May 4, 1862, John Marsh Avery (son of Judge Avery), discovered an enormous vein of rock salt (the first such discovery in the continental United States) as the Avery slaves were enlarging the brine springs. Judge Avery accelerated the development of the mine and contracted with various Southern states to provide them with salt. The Avery Salt Works produced an estimated 22,000,000 pounds of salt for the Confederacy between May of 1862 and mid-April of 1863 (Figure 15) (Chisholm 1952:176-179; Lonn 1933:32-33; Meek and Gulledge 1986:4; Raphael 1976:54-55; Winters 1963:232).

It also should be noted that Petite Anse Island was called various names, including Marsh, or Marsh's Island, until it finally came to be known as Avery Island (Chisholm 1952:175; Hansen 1971:428). Together with the name variations for present-day Marsh Island (e.g., Belle or Grand Island [Figures 15 and 16]), researching this small area often becomes problematic. For instance, a Confederate report dated November 9, 1862, noted that defense measures should be taken regarding "the rich district bordering on the Teche, including the salt mines on Marsh Island, of incalculable value to the Confederacy" (U.S. Secretary of War [*OR*] 1886:15:175). Investigation revealed that the fore-mentioned Marsh Island was, in fact, Petite Anse Island. As noted previously, care should be taken to identify the correct locations when researching these names in historical sources and maps.

The Federal command soon realized the importance of the Avery Salt Works to the Confederacy and set about employing measures, first, to stop the salt shipments and, finally, to end the salt-processing operations altogether. Although the Union blockade initially was a hindrance to salt transports from Petite Anse Island, Confederate forces quickly found a "back door" to their strongholds. From Bayou Teche, the salt shipments were conveyed to the Atchafalaya River, then over land to Alexandria and to the Red

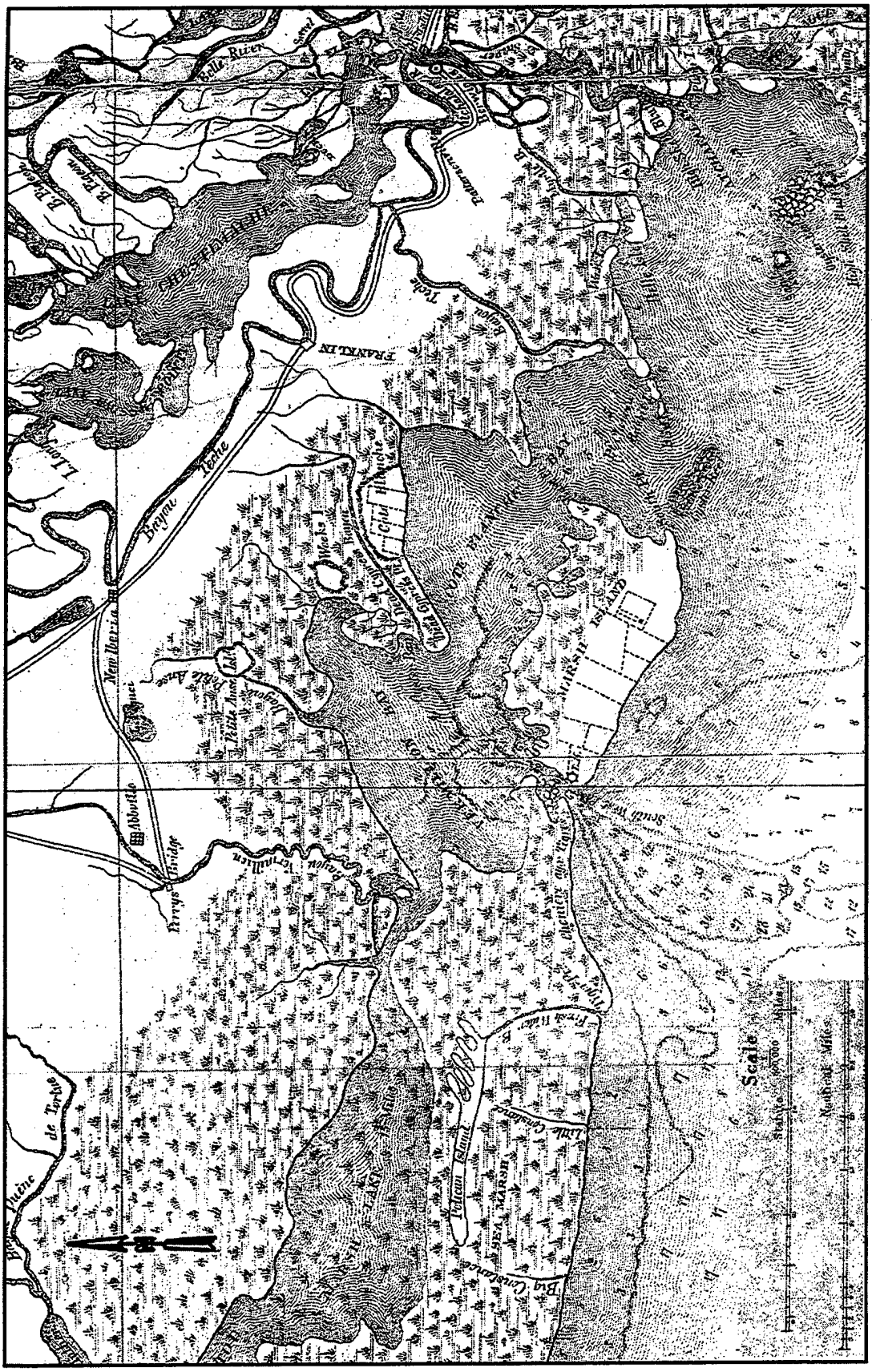


Figure 14. **[1861] Excerpt from Holle & Co.'s Hydrographical & Topographical Map of Parts of the States of Louisiana, Mississippi & Alabama, in reference to the project vicinity. Excerpt depicts structures on Marsh Island, coastal points and waterways surrounding Marsh Island, and approaches to Petite Anse Island.**

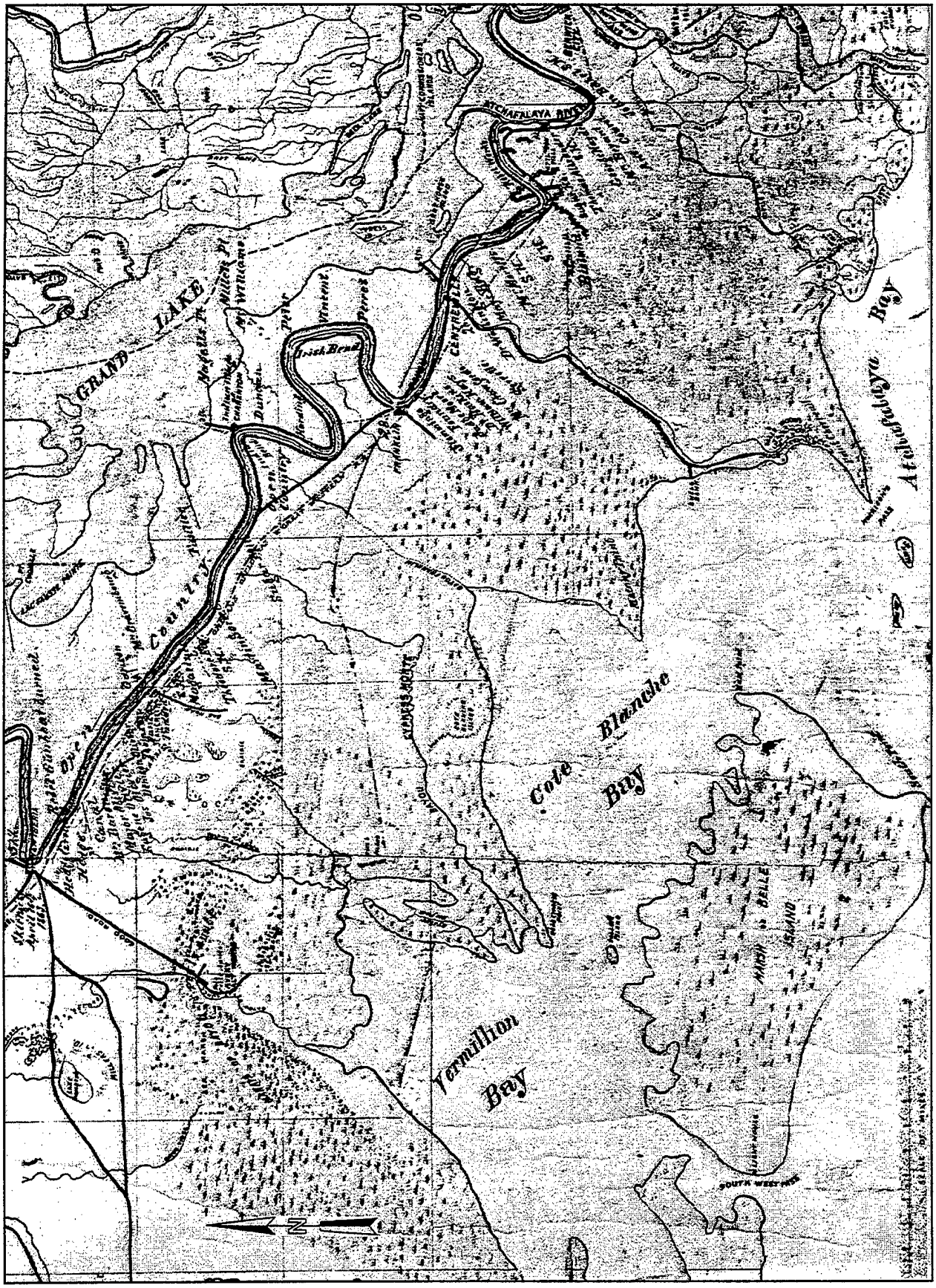


Figure 15. **[1863] Reduced excerpt from Abbot's Department of the Gulf, Map No. 8, Atchafalaya Basin, Prepared by Order of Maj. Gen. N. P. Banks. Excerpt depicts structures on Marsh or Belle Island, coastal points and waterways surrounding Marsh Island, the Avery Salt Works on Isle Petit Aunce [Petite Anse Island], and Camp Bisland.**

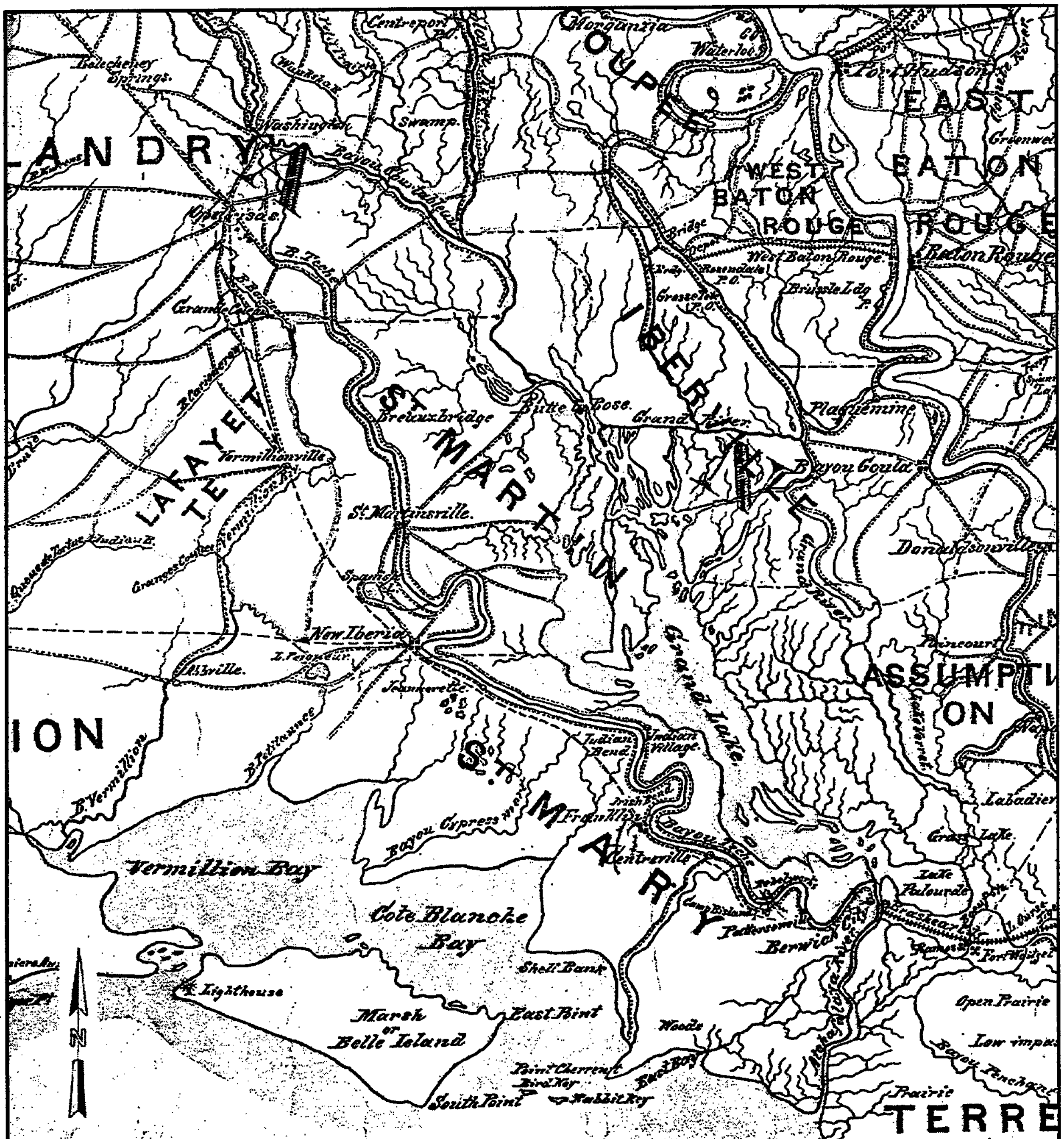


Figure 16. **[ca. Civil War] Reduced excerpt from Holtz's Map of Louisiana & Arkansas, in reference to the project vicinity. Excerpt depicts southwestern Louisiana roads and waterways and Marsh or Belle Island.**

River, where they were loaded on steamboats for transport to the Mississippi River and on to Port Hudson, Vicksburg, and other Southern-held ports (Figure 16). In anticipation of a Union attack, defenses were placed both on Petite Anse Island (i.e., two infantry companies and an artillery unit) and on Bayou Teche (Chisholm 1952:179; Hansen 1971:428; Lonn 1933:34; Raphael 1976:55-56).

In mid-November 1862, General Benjamin Butler ordered the destruction of the Avery Salt Works. As a result, two Union gunboats and a transport steamer approached Petite Anse Island from the Gulf of Mexico, through Vermilion Bay, and up Bayou Petite Anse (Figure 14). As soon as news of the Federal naval movement was reported, Confederate forces were dispatched from Camp Bisland on Bayou Teche to intercept the Federals (Figure 15). On November 21, Captain T. A. Faries' and his Louisiana Artillery engaged the enemy at the lower end of Petite Anse Island, within sight (but out of howitzer range) of the gunboats at the mouth of the bayou. The Federal forces retreated to their vessels and returned via their previous route. While the wind had aided their approach to Petite Anse Island, it worked against them during their retreat, creating a low tide that grounded the three boats for 15 – 20 days (Hansen 1971:428; *OR* 1886:15:1088; Raphael 1976:60-61).

Modern evidence of the grounding incident was discovered during the spring of 1965, when the Lake Charles Dredging Company of Lafayette, Louisiana, was conducting oyster shell dredging operations off the southeastern shore of Marsh Island. The crew suspended activities when they discovered cannon balls among the dredged shells. The men returned to the spot with a spud barge equipped with a crane and bucket, with which they brought up coal and various munitions, including cannon balls (some still crated and bearing manufacturing marks from the Savannah [Illinois] Ordinance Depot), Parrot shells, grapeshot, and canister shot. While investigating the find, the president of the dredging company spoke with a Mobil Oil Company geologist, who related the incident of the thwarted Federal attack on the Avery salt works. According to this source, when one of the gunboats grounded on a shell reef, the crew cast the coal and ammunition overboard in an attempt to gain draft (Raphael 1976:61-62). Research did not determine how near to shore the grounding occurred or where this location was in relation to the current Marsh Island project area. It should be noted, however, that one Civil War era map depicted an oyster reef just east of South Point, off the southeastern end of Marsh Island (approximately 3 km (2 mi) south of the South Barrow and Access Area project item) (Figure 14). The position of this reef in relation to the description given by the shell dredging company indicates the possibility that this could have been the area where the gunboat grounded in 1862. Of course, modern topographic quadrangles depict several shell reefs scattered around Marsh Island.

Federal forces at last succeeded in destroying the Avery Salt Works on April 18, 1863. Colonel William K. Kimball arrived early that morning with his New England troops to discover that the Confederates had abandoned the facility (Raphael 1976:137; Winters 1963:232). In his report, Colonel Kimball described the scene as follows:

> I . . . found the enemy had evacuated his works and removed his guns. I proceeded at once to destroy all the buildings, 18 in number, connected with the saltworks, steam-engines, windlasses, boilers, mining implements, and machinery of all kinds; also 600 barrels of salt, ready for shipment. About one ton of powder and one ton of nails, found in the magazine, I caused to be transported to New Iberia . . . . The bomb-proof magazine connected with the fortification I caused to be blown up and the works destroyed, so far as they could be with the means at my command (*OR* 1886:15:382).

As the structures went up in flames, the Federals flooded the salt mine and ruined the Avery sugar plantation and grounds (Meek and Gulledge 1986:4; Schweid 1980:60).

Following the destruction of the Avery Salt Works, coastal St. Mary Parish apparently remained relatively quiet through the end of the Civil War. In early 1865, a few reports were made regarding possible blockade running out of Vermilion Bay and Cote Blanche Bay, but there was no significant activity noted by either Confederate or Federal officers monitoring the region (*OR* 1896:48[1]:722, 1441). Settlers apparently

had arrived on Marsh Island by 1861, as evidenced by the structures depicted in the southern portion of the island on at least two Civil War-era maps (Figures 14 and 15); however, no further information was found regarding their activities or loyalties. Considering the lone reported incident involving Marsh Island in late 1862, it appears, then, that the island was more an obstacle to, than a strategic point for, coastal activities during the Civil War.

Postbellum Era

The years following the end of the Civil War were difficult for southern Louisiana. The economy throughout the state had been destroyed; plantations and farms, railroads and levees, businesses and homes all had been affected by the war, physically and financially. The postbellum period proved to be an era of recovery for the entire state.

Because Marsh Island was isolated from all but transient naval action, its few inhabitants no doubt recovered more quickly from the effects of the Civil War than did residents of other parts of the state. The war would have brought little change to the island settlers -- there were no battlegrounds there, and the reported naval movements near the island would not necessarily have involved onshore activities. Most importantly, the sparse population probably never was dependent on a plantation economy.

Little information could be found regarding postbellum life on Marsh Island. Minks were trapped during the winter months, i.e., from September through April, while the summer months were devoted to running cattle, a long-time Attakapas country livelihood. Marsh Island ranchers counted up to 4,000 head of cattle at the peak of that enterprise during the mid to late nineteenth century (Dwight Brasseaux 1998, personal communication; Post 1957:43-51). By the early 1870s, according to one postbellum map, an apparent road or canal traversed the southwestern side of Marsh Island from the northeastern edge of South West Pass to South Point (approximately 6 – 7 km [4 mi] southwest of the western coastal edge of the East Cote Blanch Bay project item). The map gave no other indication, though, of settlement areas on the island (Figure 17).

The political boundaries of Marsh Island changed in 1868, when Iberia Parish was created from portions of southern St. Martin and western St. Mary Parishes. As early as 1848, legislative measures and surveys were taken to organize this new parish. The groundwork was not completed before the Civil War, which, of course, further delayed the process. Finally, on October 30, 1868, the Louisiana State Legislature approved the establishment of Iberia Parish (Figures 11 and 17) (Bergerie 1962:22-23; Pourciaux 1985:6).

Twentieth Century

The principal history of Marsh Island really began in the early twentieth century with the development of the wildlife refuge. In fact, Edward McIlhenny, who first developed the preserve on Marsh Island, was one of the nation's early conservationists, and many consider him to be the founder of the wildlife refuge program for the state of Louisiana. Edward Avery McIlhenny, or Mr. (M'sieu) Ned, as he was familiarly known to Iberia Parish residents, was the grandson of Judge Daniel Avery of Avery Salt Works fame. By the early twentieth century, Edward McIlhenny had become well known as a naturalist, botanist, ornithologist, and writer. His experiences included the study of migratory birds as part of an 1893 Arctic expedition, the collection of flora from exotic locales for his Avery Island gardens, and the creation of an immense sanctuary on the family property for the endangered snowy egret. McIlhenny's spectacular gardens and "Bird City" exist on Avery island to the present day, while his scientific writings, based on observations of wildlife ranging from boat-tailed grackles to alligators, remain well-respected in the zoological realm (Hallowell 1979:26-29; Iberia Parish Library n.d.:19; Meek and Gulledge 1986:4-5, 28, 51-52; Schweid 1980:59-63).

Ned McIlhenny's first large-scale marsh refuge endeavor began ca. 1910, with the considerable financial aid of Charles Willis Ward, on the Vermilion Parish acreage that became known as the Louisiana State Wild Life Sanctuary. That preserve was "the first wild life refuge in the world, privately donated, for the public good" (Louisiana Department of Conservation [LDC] 1933:255). Today, the sanctuary is called the State Wildlife Refuge and it covers 13,000 ac (5,261 ha) of the brackish marsh located on the western side of Vermilion Bay, just west of Marsh Island (Iberia Parish Library n.d.:19; Lou-

Figure 17. [1873] Excerpt from Lockett's Topographical Map of Louisiana, in reference to the project vicinity. Excerpt depicts apparent road or canal traversing the southwestern side of Marsh Island.

isiana Department of Wildlife and Fisheries [LDWF] 1997:21).

In 1911, Ned McIlhenny secured purchase options to over 75,000 ac (30,353 ha) of land on Marsh Island in order to establish another refuge, primarily to protect wintering ducks and geese. Again, Charles Ward helped McIlhenny with the property acquisitions, but the chief financial support came from New York philanthropist Mrs. Russell Sage. For $162,980.02, the acreage, totaling 75,663.95 ac (30,621 ha) was purchased from the following landowners: Lawrence F. Fabacher, Victor Von Schoeler, John D. Grace, W. P. Reymond, S. I. Reymond, Richard J. Hummel, Benjamin R. Mayer, Alexander D. Barrow, James Webb, Ashley W. Pettigrew, Lewis J. Bass, Sam Nye Bass, Theolin Landry, The Broussard Realty Co., and Dr. J. W. Sanders. In order to place the property under state control, McIlhenny, as agent for Mrs. Sage, offered the acreage to the Louisiana Conservation Commission on August 12, 1913, for use as a wildlife refuge for a term of five years. In 1916, Mrs. Sage transferred the title to most of Marsh Island to the Russell Sage Foundation. Following the death of Mrs. Sage in 1918, her executors transferred the remainder of Marsh Island to the Russell Sage Foundation in 1920. The latter donated the Marsh Island property to the State of Louisiana in November of 1920, with restrictions governing its management and use, along with the stipulation that failure to adhere to the transfer agreement would result in the return of the land title to the Foundation.

By 1933, the Marsh Island Wild Life Refuge totaled 79,300 ac (32,093 ha), and it encompassed the entire island. Within the next decade, the acreage was renamed the Russell Sage Wildlife Preserve in honor of its chief benefactor. Today, the property contains approximately 82,000 ac (33,185 ha), predominantly brackish marsh, and is known as the Russell Sage Foundation State Wildlife Refuge, or more commonly as the Marsh Island Wildlife Refuge (Glenn et al. 1947:1:267-270; Iberia Parish Library n.d.:20-21; Jones 1965:1, 5; LDC 1933:255, 257; 1943:93; LWLFC 1953:106).

During his lifetime, Russell Sage had accumulated a fortune of around $65,000,000.00, most of which was left to his widow following his death on July 22, 1906. As a memorial to her late husband, Margaret Olivia Sage established the Russell Sage Foundation in 1907 for "the improvement of social and living conditions in the United States of America" (Glenn et al. 1947:2:667). Although Mrs. Sage's philanthropic projects were varied, they ranged from improvements to New York City's Central Park and City Hall to the creation of hospital trusts in New York and Guam; the Marsh Island refuge apparently was among those gifts that "gave Mrs. Sage keen pleasure" (Glenn et al. 1947:1:268-269). After her death on November 4, 1918, Foundation officer Robert W. de Forest included the following statement in his memorial to Mrs. Sage: "The well-being of the least and of the greatest interested her, from the countless birds whose lives she saved by buying Marsh Island, to the men and women whose living conditions she earnestly hoped might be improved through the work of the Foundation" (Glenn et al. 1947:1:268).

As originally established, the refuge on Marsh Island was to remain free of hunters, a restriction monitored by the State of Louisiana. In the ensuing years, controlled trapping on the island was introduced by the State, particularly to control the nutria and alligator populations. Native to South America, nutria were introduced to Louisiana by Ned McIlhenny, ca. 1937-1938, to add to his faunal "collection" on Avery Island. It was hoped that the voracious herbivore appetites of these furry rodents would solve the problem of Louisiana's water hyacinth-choked waterways. As the prolific nutria escaped from their pens, they soon proved themselves to be pests -- they devoured gardens and sugarcane, they drained rice fields by burrowing through the containment levees, and they consumed the marsh grasses that represented the necessary forage for the wild fowl and native muskrat of the area (Hallowell 1979:29-32; Schweid 1980:63-64; Van Pelt 1946:4).

Destructive and less valuable to trappers than muskrats, the nutria were placed on the Louisiana "outlaw" list from 1958 to 1968. Nutria pelts became valuable, however, in the European market during the 1950s (Hallowell 1979:31-32; Schweid 1980:64). In 1967, in fact, the Fur Division of the Louisiana Wild Life and Fisheries Commission proposed a nutria promotional program that included the following recommendations:

> Romance a story of Louisiana as the greatest fur-bearing state in the United States, through double spread editorials in Life Magazine, trade papers, business magazines, such as Business Week, Time and Fortune.
>
> The promotion of "FASHION" in Louisiana Nutria. For this purpose we shall order the newest creative fashions of fur-lined coats, jackets, capes, and sweaters to be made of nutria or lined with nutria from the leading designers of the world (Louisiana Wild Life and Fisheries Commission [LWLFC] 1967:39).

Among the suggested showcase designers were Christian Dior, Pierre Balmain, and De Givenchy. Color spreads were proposed in such fashion magazines as *Vogue* and *Harper's Bazaar*, and advertising was recommended through television, radio, and newspapers, while fashion shows were advocated for Bergdorf-Goodman, Saks Fifth Avenue, Neiman Marcus, and other fine department stores (LWLFC 1967:38-45). Of course, nutria pelts never replaced mink or sable, but for Louisiana trappers and state officials, the "objective to develop and create a universal appeal for Nutria" was quite an ambitious dream (LWLFC 1967:40).

The alligator has escaped the nuisance stigma of the nutria and it traditionally has been regarded, instead, as an occasional danger to the unwary. Alligators have been protected by hunting restrictions since 1958; however, alligator farms have proved to be the solution to those hunters and traders disgruntled by legal limitations. On Marsh Island, the alligator population has been a longtime subject of research. It was only in recent years that ecological population control mesures forced the need for alligator harvests on the island (LDWF 1996:22, 1997:21; LWLFC 1963:44-45).

Cattle were the only domestic livestock raised on Marsh Island during the twentieth century. During the late 1950s, research was conducted on the refuge "to determine the effects of cattle on marsh plant and animal life" (LWLFC 1957:61). In 1957, cattle enclosures were constructed in various areas of the island to study the impact of grazing on diversified terrain. Although it had been suggested that ranging cattle in the marshland might be "actually beneficial to wildlife", this study apparently produced no conclusive data, and the program was suspended ca. 1962 (Dwight Brasseaux 1998, personal communication; LWLFC 1957:61).

Just as Marsh Island initially was to be hunter-free, it also was established as a haven against commercial and industrial activities. The exception to that restriction has been the petroleum industry, which, by cooperative arrangement with both the Russell Sage Foundation and the State of Louisiana, has carried on exploration activities on Marsh Island since the mid-1940s and production since the early 1950s. Oil and natural gas has been recovered from Iberia Parish fields since at least 1942; however, nearly a decade passed before the first well was drilled on Marsh Island in 1951. Commercially viable reserves of natural gas were not discovered there until 1959 (Glenn 1947:2:491-492; Iberia Parish Development Board ca. 1949:44-46; Jones 1965:5; LWLFC 1953:106). Today, the project area falls within the Lake Sand Oil and Gas Field, which extends beyond Marsh Island and into East and West Cote Blanche Bays (Figure 18) (DTC, Incorporated 1992).

Petroleum exploration actually began on Marsh Island in 1944 due to pressure from the U.S. Department of the Interior and the State of Louisiana following the outbreak of World War II. The Russell Sage Foundation trustees agreed to limited petroleum exploration provided "that it proceed under adequate protection of the island for the purposes for which it was donated, with minimum disturbance of wild life, and with the further provision that any revenues resulting be divided equally between the Foundation and the state of Louisiana, with the state devoting its revenues to 'maintaining, policing, and improving Marsh island as a wild life refuge'" (Glenn et al. 1947:2:492). Surplus revenues were to be used, first, for other Louisiana wildlife projects and, then, for statewide health and education programs (Glenn et al. 1947:2:492).

Modern petroleum exploration has brought great changes to the physical landscape of Marsh Island. By the early 1960s, flotation canals traversed the island in order to facilitate the barge transport of oilfield equipment. In 1963, the Louisiana Wild Life and Fisheries Commission described this "most perplexing problem" presented

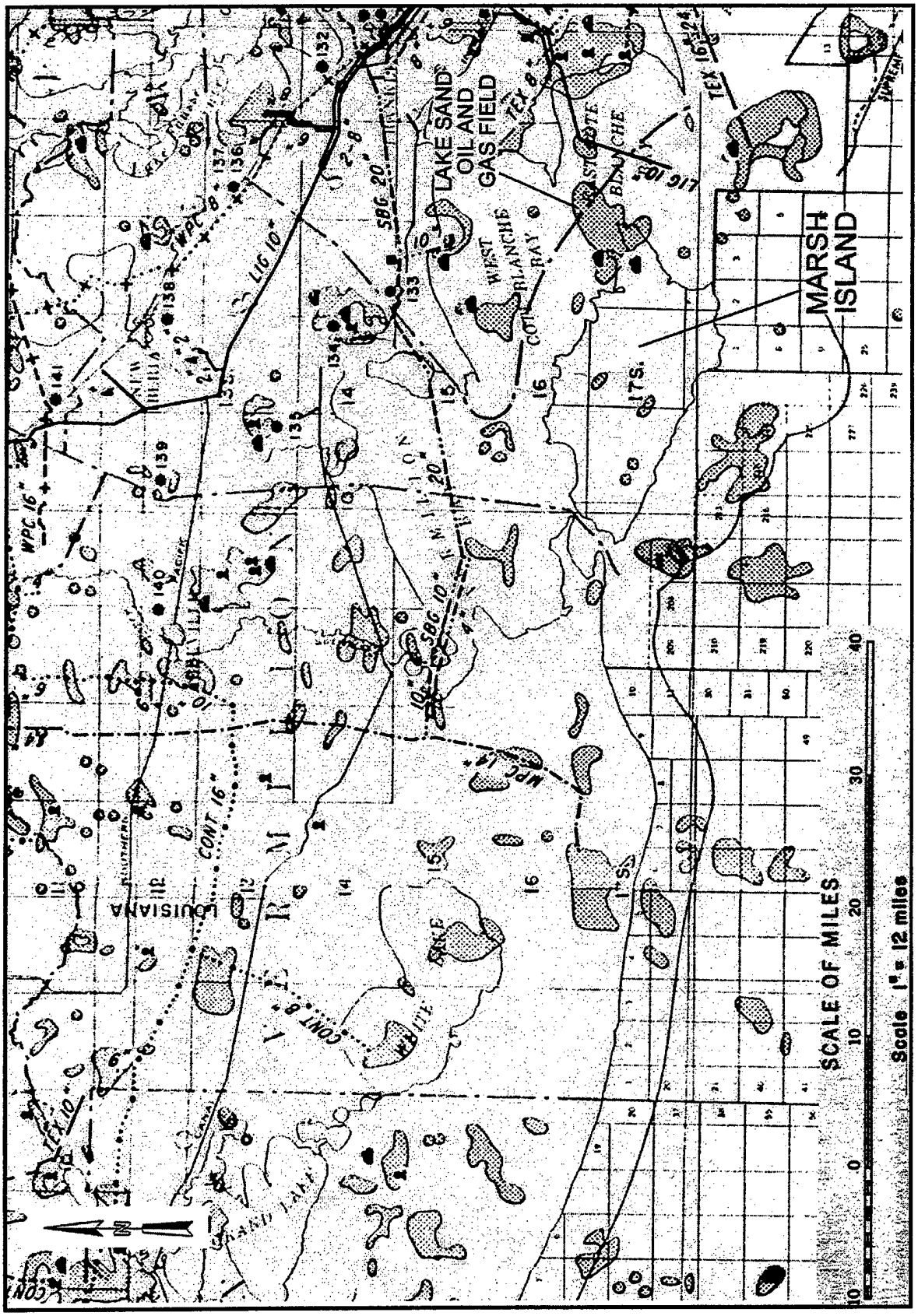


Figure 18. **[1974] Excerpt from the Louisiana Geological Survey's Intrastate Gas Map of Louisiana. Excerpt depicts Marsh Island, its surrounding waterways, and the Lake Sand Oil and Gas Field.**

by "the management of mineral operations . . . in a manner consistent with the wildlife preservation and development program" as follows:

> Although seismograph operations have been relatively simple to handle, the prevention of damage to valuable wildlife marshes is difficult during the period that the mineral lessee begins development. The general approach used by most mineral operators along the Louisiana Coast in reaching drilling sites has been to dredge out a flotation canal some eight feet in depth and sixty to eighty feet in width and barge in the drilling rig and other heavy equipment. Such operations as this not only cause direct losses of many acres of marsh in the excavation of the canals, but also creates water management problems involving drainage of the marshes, increased tidal flow, and some rapid changes in water levels and salinities. This generally tends to reduce the quality of the marsh for wildlife by bringing about changes in vegetative types, particularly in the brackish areas (LWLFC 1963:176).

While less-damaging roads could be constructed to drilling sites in some coastal areas, water-bound Marsh Island generally was too isolated and bemired to employ that method of entry. State officials hoped to lessen the potential damage by "requiring the lessees to confine their access as much as possible to existing waterways. When it is necessary to cross a marsh area with a drilling rig it will be specified that the canal will be completely enclosed by means of a levee constructed from material dredged out of the access channel" (LWLFC 1963:176-177).

Through the years, it appears that conservation and petroleum activities have managed to reach a relatively comfortable co-existence on Marsh Island. Environmental research throughout the refuge remains the focus of the Louisiana Department of Wildlife and Fisheries, while trapping is done only in a carefully monitored situation when overpopulation becomes a problem. Fishing, shrimping, crabbing, and boating are among the recreational pastimes permitted to the public; however, each of these activities is strictly monitored by Louisiana conservation officers (Jones 1965:2-5; LDWF 1997:19-21).

Summary

The Marsh Island project area is situated in an area of isolated marshland and it has been traversed by numerous petroleum facility access canals. With the exception of petroleum exploitation and refuge maintenance, little has changed in the character of the island. Historically water-bound, Marsh Island has remained dependent upon its natural resources, i.e., the wildlife-rich marshes and coastal waters, from earliest settlement to the present day. Because the various project items are located in such a remote region, it is unlikely that loci containing major concentrations of historic remains will be found in the area. Marsh Island traditionally was worked by trappers, fishermen, and small farmers. Considering the terrain, the forces of nature, and the impact of modern petroleum activity, their modest homes and outbuildings probably would not have survived the years. Most twentieth century structures would have been associated with the maintenance of the wildlife refuge, e.g., patrol camps, water control weirs, and waterfowl breeding pens. These, like the structures related to the petroleum industry, generally would be of temporary character and they would not necessarily be expected to weather time and nature.

Historic Maritime Activity

During the historic contact period, European maritime activity around the project area primarily was limited to oblique contact via transient shipping. Aside from poorly documented pre-Columbian sea trade, the earliest commerce on Gulf waters was dominated by the Spanish. Early routes through the northern Gulf of Mexico were used primarily for travel to and from Spain's profitable holdings in Central America. From 1519 on, Spanish fleets traversed the Gulf from Vera Cruz to Havana, taking advantage of a clockwise current which ran through the Gulf. From Havana, these vessels joined ships from Panama and then they returned to Spain via the Florida Straits and the northerly Gulf Stream.

Occasionally these sea routes brought Spanish vessels into the coastal waters along the northern Gulf and past the project area, but it was not until many years later that ports developed in this part of the Gulf and trade increased.

The emergence of this new activity and the subsequent development of new trade routes was precipitated by the French. The abortive expedition of LaSalle in 1685 was followed by the more successful establishment of New Orleans by Iberville in 1699. France established additional footholds at: Biloxi (1699); Dauphin Island, south of Mobile Bay (1699); and Mobile Bay (1701). Shipping routes linked these ports with New Orleans, as well as with the Windward Islands. In the first half of the eighteenth century, the French attempted to expand these routes to include Spanish ports, but with the exception of connections between Mobile and Spanish Pensacola, these efforts failed.

In the later colonial period, French activity in the northern Gulf waned, while Spanish trade was increasingly joined by British vessels. As settlements grew, coastal trade became ever more important, with small vernacular craft linking coastal areas and inland settlements. The most common craft used on the inland waterways of Louisiana, a vessel based on the native dugout canoe, was the pirogue (Pearson and Saltus 1991:26). Other vessel types such as the chaland, esquif, and bateau also were used (Pearson and Saltus 1991:26; Pearson et al. 1989). The shallow bays and often narrow waterways in the region were a key factor in the development of these small, flat-bottomed boats.

Early in the nineteenth century, the economic and political situation in France forced that country to sell the Louisiana colony to the United States for $15 million. The 1803 acquisition of the Louisiana Territory by the United States brought a new influx of settlers, primarily Anglo-Americans from the southern and western parts of the country. Some of these new immigrants acquired extensive tracts of land and established large inland plantations in St. Mary Parish, near Franklin, Louisiana. Large landholdings were essential to the plantation economy which was emerging, and the ready access of these new residents to capital made their acquisition efforts successful. One result of this shift in land use and ownership was the displacement of much of the native Acadian and Houma Indian populations. These groups were forced south, into coastal bayous such as those along the coast north of the project area. The smaller amount of arable land in these areas had made earlier settlement unattractive, and the new residents were forced to rely more heavily upon extractive pursuits such as trapping, hunting, and fishing (Stout 1992:10; Robinson and Seidel 1995:14).

After the American acquisition of Louisiana, the slave trade and the export of cotton, sugar, and salt became important elements of the region's maritime commerce. The development of this economic base in the area led to the development of a plantation economy in the early nineteenth century (Pearson and Saltus 199:27). Cotton and sugar were shipped out of the Gulf to the east coast of the United States (principally to New York, which controlled much of the region's trade) and to Europe. Throughout the nineteenth century, sugar production became increasingly important; in the years before the Civil War, its production had spread to almost all of the arable land in the area (Pearson and Saltus 1991:28). Until the development of an adequate railroad network, the vast bulk of the products of the South was transported by water, with New Orleans serving as the primary shipping port in the south. The traffic for this and other commodities often was seasonal, with cotton being shipped primarily from September to May (Murphy and Jonsson 1993:156).

Inland of Vermilion Bay lay a complex network of rivers, streams, lakes, bayous, and backwaters, and this network was used for communication and trade between inland settlements and coastal gateways such as New Orleans. Although some early water traffic reached these inland areas via the Atchafalaya Bay and River, it was not until the 1830s or 1840s that shipping began to reach the area regularly by sea. The following advertisement for the *Belle of Attakapas* was an example of this shift:

> The substantial and well known steamer Belle of Attakapas, Captain C. Johnson, having been thoroughly repaired, and refitted, will run, on the sea route as a regular packet throughout the season, between New Orleans and New Iberia, taking freight and passengers for all intermediate landings on the Teche, Atchafalaya & Bayou Boeuf (October 18,1845, edition of *The Planters Banner*) (Pearson & Saltus 1991:31).

New Iberia, one of the more important inland settlements, was reached via the lower Atchafalaya River and Bayou Teche. Before and after this period, smaller, light draft steam vessels, which were ill-suited to the hardship of an open Gulf passage, threaded the inland waters between ports of call such as New Iberia and New Orleans, but the Gulf route became increasingly more important.

Closer to the mouth of the Atchafalaya River than New Iberia lay the town of Franklin. It was situated approximately 24.14 km (15 mi) north of Marsh Island. Franklin provided access to the interior for relatively deep draft vessels via the Atchafalaya and lower Bayou Teche (Pearson and Saltus 1991:29). Pearson and Saltus (1991:29) provided a list of arriving and departing vessels from early December of 1846, and emphasize the activity of ocean-going vessels in the area during this period. In the 1850s, Brashear City was established on the site of modern-day Morgan City. It provided a more convenient gateway to the Gulf through the Atchafalaya.

The economic and social impacts of the Civil War on the region were devastating. During the war, the Union blockade effectively suppressed commercial shipping and coastal trade, and agriculture and commercial water traffic essentially ceased (Pearson and Saltus 1991:38; Comeaux 1972:17). Aside from logistical support for the military, the only commercial ventures were carried out by blockade runners, who ran great risks for substantial profits. New Orleans and Mobile were two of the most important destinations for these vessels.

It was not until the 1870s that commerce in the region gradually revived. Much of this new activity was spurred by the dredging of a ship channel from the Gulf to the lower Atchafalaya River. Charles Morgan financed this dredging in 1871 to allow his steamship line to navigate the Atchafalaya River up to Brashear City. "Morgan's Ditch," as it was known, measured 9.66 km (6 mi) in length, over 30.49 m (100 ft) in width, and 3 m (10 ft) in depth (Pearson and Saltus 1991:40). Subsequent to its dredging, in 1873 Congress established Brashear City as an official Port of Entry, and in the same year the Louisiana legislature acknowledged Morgan's contributions to the regional economy by renaming the principal port of the area from Brashear City to Morgan City.

During the same period in the late nineteenth century, the railroad became increasingly important to the economic revitalization of the Atchafalaya region. Although the transportation of goods via the waterways of the area was more economical, the railroad became the favored mode of transportation for many shippers because of its speed (Pearson and Saltus 1991:40). Speed was especially important in the shipping of perishable goods, and railroad expansion therefore was linked to the growth of industries such as oystering. The oystering industry around Vermilion Bay grew rapidly with the development of the new rail lines, especially after the railroad bridge at Morgan City was completed. Within a relatively short period of time, numerous sailing luggers took up oystering and fishing out of Morgan City, taking advantage of the new rail outlet for their perishable harvests (Pearson and Saltus 1991:42).

Throughout the nineteenth century, general merchandise and manufactured goods were shipped into the Gulf from the northeastern United States. In the wake of the Civil War, New York's hold on maritime commerce in the Gulf was broken, and traffic moved between the Gulf and many other ports. Coastal networks were joined with direct routes to the east coast, Europe, the Caribbean, and South America. Outbound cargoes such as cotton were joined by exports such as lumber and lumber products, which were bound for destinations ranging from the northeastern United States to Caribbean and European ports.

Despite legislative attempts to restrict shipping to American flag vessels, increasing numbers of foreign vessels (especially European) traveled to ports along the Gulf. New ports such as Tampa and Port Arthur attracted traffic, while the older ports like Mobile, New Orleans, Galveston, and Brownsville were joined by numerous smaller points of entry. These new ports served as gateways to a broadened export base; phosphates from Tampa and oil from Port Arthur joined the older commodities such as cotton, grain, and lumber (Garrison et al. 1989). Trade routes changed little during the twentieth century, although German submarines forced shipping into the shallower coastal waters for a

period during World War II (Garrison et al. 1989).

Throughout the twentieth century, the commercial traffic north of Vermilion Bay has been limited primarily to channels dredged or maintained by the U.S. Army Corps of Engineers. Traditional types of watercraft such as pirogues, skiffs, and bateau continue to be used by locals, although fiberglass and aluminum have almost entirely replaced wood in the construction of these vessels (Pearson and Saltus 1991:43). In the coastal area, much of the traffic today is related to oil and gas field development, although fishing and shrimping boats are common.

Shipwreck Potential

The types of vessels common to the northern Gulf of Mexico during the historic period have received much attention. Garrison et al. (1989) summarize succinctly the range of historic vessels involved in ocean-going trade in the Gulf. These include 26 classes that were common during the sixteenth and seventeenth centuries, 15 classes typical of the eighteenth century, and 27 classes of vessels that were characteristic of the nineteenth and twentieth centuries.

Almost all of the vessel types listed by Garrison et al. (1989) would have been suitable for ocean or coastwise voyages. The largest of these vessels frequented major trade routes through the Gulf and participated sporadically in coastwise trade. They tended, however, to stay in open water until approaching port, at which point they frequented deeper channels.

Much of the coastal trade of the mid-nineteenth to early twentieth century, however, was carried out by smaller vessels, and the popularity of vessel types reacted to shifts in cargoes and the balance sheets of the vessel owners. Up to the 1860s, for example, lumber bound for the coastal trade and for the West Indies generally was carried in schooners with capacities approximately 100,000 board feet. Lumber bound for more distant ports usually was carried by larger vessels, such as barks, brigs and ships, with capacities of up to 500,000 board feet. Through the course of the nineteenth century, however, schooners became increasingly popular as merchant vessels, especially for coastal trade. They were able to displace vessels rigged as brigs primarily because of their ability to sail efficiently with fewer hands. For similar reasons, bark rigs gained in popularity over ships, especially after the depression experienced at mid-century. Barks were almost as fast as a full-rigged ship, but they required a smaller crew (Murphy and Jonsson 1993:148-156; Eisterhold 1972:270).

Local maritime activities, ranging from simple travel to fishing, shrimping, and other water-oriented pursuits, were carried out in smaller, often locally built vessels. Pearson et al. (1989), have reviewed the history of water traffic and craft within the area now administered by the U.S. Army Corps of Engineers, New Orleans District. Stout (1992) and Robinson and Seidel (1995) also have studied the vernacular craft of the bayou and coastal waters; they focused on the traditional craft common to Bayou DuLarge in Terrebonne Parish, Louisiana. Robinson and Seidel (1995) place such vessels in their historic context and they review the evolution of the various craft. Their discussion also includes a detailed description and analysis of several recent vernacular craft, including oral histories with their builders. Other published studies of coastal vernacular craft common to Louisiana include those by Knipmeyer (1956), Goodwin et al. (1984), and Comeaux (1985).

Taken together, these reports provide a substantial framework for understanding the vessel types which might have been lost within the project area. Knowledge of how these vessels were used, their routes of travel, and the misfortunes that could befall them, enables researchers to predict how and where the vessels may have been lost.

During the historic contact period, vessels traversing the northern limits of the Spanish routes out of Mexico and towards Havana could have passed south of the project area. Because of the clockwise loop current in the Gulf, this route became a standard for vessels moving east, toward the Caribbean or the Florida Straits. Storms and errors in navigation could push the track of unwary vessels into the shoals and barriers located within the project area. Coastwise trade that was headed west often traversed a route closer toward shore. A series of counter-clockwise eddy currents provided an advantage to those vessels, inducing them to run closer to

shore. Such natural advantages were offset by the greater potential for running afoul of shoals, and the choice of a route for any given voyage throughout the historic period always involved a weighing of advantages and disadvantages, of costs and benefits.

Navigation, trade routes, and sailing practices are heavily influenced by local environmental phenomena such as currents and winds. The system of currents in the Gulf of Mexico is controlled in large part by the location of the Loop current, which circulates clockwise, and associated counterclockwise flowing eddy currents (Garrison et al. 1989). Garrison et al. (1989) also describe the typical wind patterns for the northwest Gulf, in which typical summer winds are dominated by the easterly trades and especially by winds from the southwest. These winds often shift to the northeast during the winter months, and rapidly moving cold fronts (northers) frequently interrupt the winter pattern. The shift from summer patterns to those of winter occurs between September and October. Waves of 1 to 1.5 m (3.3 to 4.9 ft) typify conditions on the northern Gulf of Mexico, with the highest significant wave height near the project area measuring nearly 4 m (13.1 ft) (Garrison et al. 1989).

Although much attention has been focused on the correlation of storms and shipwrecks, the incidence of storms in specific parts of the Gulf and the distribution of shipwrecks are not perfectly correlated. More important is the increased likelihood of a wreck when there is a conjunction of storm paths with busy shipping routes and shallow waters, especially lee shores (Garrison et al. 1989; Irion et al. 1992). There are, of course, many other factors that result in shipwrecks. These include collision with another vessel, hitting an obstruction, grounding, fire, explosion, scuttling, or loss in military action. The circumstances under which these events are likely to occur are known, and this makes it possible to predict where vessel loss is most likely.

Collision is most probable where shipping activity is heavy, especially in busy channels or shipping lanes, near ports and near the mouths of navigable rivers. The importance of Morgan City as a destination meant that the risk of collision around the mouth of the Atchafalaya River and in the approach channel was and continues to be higher than along other parts of the local shoreline. Foundering is most likely to occur in exposed areas, especially during storms and where waves pile up and break in shallow waters (Irion et al. 1992). These conditions are found in the near shore portions of the current project areas, where seas become rough as the winds increase.

Groundings occur when a vessel strikes a shoal or the shallows near a shoreline. Heavy weather can force a vessel ashore, as can errors in navigation. Engine failure or other problems often have the same result, when wind and tide push a disabled vessel aground. Although a vessel may survive these more passive groundings and be pulled off or refloated on a higher tide, groundings due to storms more often result in the loss of the vessel. Water depths in East Cote Blanche Bay rarely exceeded (15 ft) 4.6 m.

Submerged obstructions are a hazard most often encountered in shallow waters or rivers. Partially submerged and floating logs are frequently sighted throughout the project area. Structures related to the oil industry such as rigs, well heads, and underwater pipelines also serve as potential hazards. These obstructions are more of a hazard to fast moving vessels and craft with relatively light hull fabric. Some of the light draft steam vessels designed for river travel fall into this category, as do smaller wood vessels and fiberglass craft.

Fire and explosion can happen at any time, while losses due to military activity are related to particular events and places (Irion et al. 1992). The only record of serious military activity which might have resulted in vessel losses in this area is for the Civil War. A union gunboat is reported to have run aground for a short period of time in the vicinity of East Cote Blanche Bay. Despite the Union blockade of the area and naval movements up the Atchafalaya, research has not revealed any Civil War losses in the project area.

Hydrological and biological processes probably have impacted any shipwrecks or other archeological remains lying within the submerged portions of the project area. In the shallower portions of the project area, the seafloor is above the wave base, so that exposed archeological remains would have been disturbed by both tidal currents and storm waves. The tropical

storms, which visit the region, also can create strong bottom currents, called "geostrophic currents," which can scour the bottom.

The preservation of archeological materials in the shallow inner shelf waters of the Gulf often is poor due to environmental conditions (Irion et al. 1992). Organic materials, for example, are less likely to survive because of the medium temperatures of the sediments, their richness in oxygen, and frequent exposure and disruption by waves. Wood, in particular, suffers due to the activity of shipworms (*Teredinidae*) and other borers such as gribbles (*Limnoria*, etc.). Deposits of silty mud from the east (originating in the Mississippi) and from the Atchafalaya River's flow, however, can have a cushioning effect upon such influences, capping off remains and reducing oxygen. Recent research also indicates that organic and other remains, even in shallow, high energy zones, often can be surprisingly robust and well-preserved (Seidel and Murphy 1996).

CHAPTER V

PREVIOUS INVESTIGATIONS

Introduction

In a landscape as dynamic as the Mississippi River deltaic plain, it is only natural for changes in the character of the landscape to have influenced prehistoric and historic settlement throughout the area. Moreover, these changes not only influenced the locations where humans settled, but also they effected the preservation of the prehistoric or historic cultural deposits that they left behind. In view of these changing constraints on human activity, an appreciation of the formation of the Marsh Island landscape and its evolution are important in predicting where habitation may have occurred, identifying where archeological investigations should be focused, and developing a cultural context in which to evaluate any remains encountered during survey. A review of the geomorphology and landscape evolution of the current project areas is contained in Chapter II. The current chapter presents a summary of previously recorded archeological sites in the project region. This information, used in conjunction with the geomorphic and landscape data, was employed to develop a general model of prehistoric and historic period settlement in the project region.

The information presented below is based on data currently on file with the Louisiana Department of Culture, Recreation, and Tourism, Office of Cultural Development, Division of Archaeology in Baton Rouge; the U.S. Army Corps of Engineers, New Orleans District; and at R. Christopher Goodwin & Associates, Inc. Both the quantity and quality of the information pertaining to previously identified cultural resources located in the general vicinity of the current project areas are summarized in this chapter. This information (site type, site function, site location, and cultural affiliation) was compiled in advance of fieldwork to aid in developing a research strategy that considered the types and densities of cultural resources that might be encountered during the Phase I investigation of the 13 current project items.

General Research History of Archeological Investigations in Coastal Louisiana

The presence of prehistoric period archeological sites throughout south Louisiana was addressed as early as the nineteenth century by James Leander Cathcart and John Landreth. In 1815, the U.S. Navy commissioned Cathcart as an agent and Landreth as a surveyor in an effort to locate and record stands of live oak and red cedar that could be used for shipbuilding (Prichard et al. 1945:735-736; Weinstein and Kelley 1992:9-17). These men traveled through the region in 1819 and they documented their findings in a series of journals. Recorded within these diaries were accounts of their visits to numerous archeological sites in the region. A review of these travels is provided by Weinstein and Kelley (1992:9-17).

Following Cathcart and Landreth, the region was surveyed in 1842 by the U.S. Army Corps of Topographical Engineers (Weinstein and Kelley 1992:14). Important archeological sites, including the Berwick Mounds (16SMY184) and the Gibson Mounds (16TR5), were documented as a result of this early mapping project.

Early in the twentieth century, C. B. Moore visited a variety of prehistoric mound sites scattered along the eastern seaboard to Florida. Moore also made his way through Alabama, and

into Mississippi, Louisiana, and Arkansas. Moore did visit the project area directly, and while his techniques were not as precise as those of a modern excavator, his observations and collections from numerous sites in northern Louisiana and southern Arkansas provide the only information available for many previously destroyed cultural resources (Moore 1909 and 1912).

In 1926, Henry Collins, of the U.S. National Museum, organized the first true archeological survey of coastal Louisiana (Collins 1927). Collins visited a number of mound sites within the vicinity of Houma, Louisiana, and he drew numerous conclusions regarding settlement patterns throughout the region. He observed that "unexpected numbers" of earthen mounds with their associated shell middens were located along the lakes and bayous of the area (Collins 1927:201). He was also among the first to recognize the coincidence of shell middens and areas of prehistoric occupation in coastal Louisiana, noting that *Rangia cuneata* shell found near the mounds represented the basic kitchen refuse of the Native Americans living along the waterways. Finally, Collins (1927) suggested that the mounds in Louisiana had a direct cultural affiliation with similar settlements found to the east along the Gulf Coast and in Florida. He based this assumption on the presence of the stamped, incised, and punctuated pottery types that are found in both areas (Collins 1927:206).

The study of Native American occupation in southern Louisiana and the Lower Mississippi Valley in general continued to make numerous and significant advances through the twentieth century. Among the most important works were those of Kniffen (1936, 1938), Ford (1935, 1936, 1951), Ford and Willey (1940), Ford and Quimby (1945), Phillips et al. (1951), Quimby (1951, 1957), Phillips and Willey (1953), Ford et al. (1955), Ford and Webb (1956), and Willey and Phillips (1958). These investigations were followed by the monumental study completed by Philip Phillips (1970), which developed the major ceramic typologies and chronologies that subsequently were followed by later researchers working in the Lower Mississippi Valley.

The first recorded cultural or archeological study involving Marsh Island was undertaken in the years following World War II by W. G. McIntire of the School of Geology at Louisiana State University (LSU); this work was supported by the Offices of Naval Research (McIntire 1954; 1958). McIntire (1958) investigated approximately 38,847 km^2 (15,000 mi^2) of the deltaic and sub-deltaic coastal region of Louisiana. The survey area extended east from the Sabine River in southwest Louisiana to the mouth of the Pearl River. This ambitious survey resulted in the identification and examination of over 500 sites along the coast and islands of south Louisiana. McIntire (1954) described these sites as shell or earthen mounds, shell middens, black-earth (earthen) middens, and beach deposits. Site investigation goals were largely descriptive, and they consisted of: collecting cultural material; correlating each site with its physiographic setting; identifying the types of sedimentary material associated with each site; and documenting the floral and faunal remains present at each site. These goals were met through a combination of subsurface boring and controlled or semi-controlled collection that was followed by laboratory analysis by specialists representing a variety of disciplines.

Although not discussed in the text, the appendices to McIntire's (1958) report depict only two prehistoric sites on Marsh Island (one shell midden and one beach deposit). In addition, 22 other prehistoric sites (13 shell middens, seven beach deposits, one shell mound, and one earthen mound) are illustrated along the stretch of coastline that contains those portions of Iberia, St. Mary, and Vermilion Parishes that form the coastline of Vermilion Bay, West Cote Blanche Bay, and East Cote Blanche Bay, i.e., between Southwest Pass (Hell Hole Bayou) and Point Chevreuil (McIntire 1958 plate 2). None of these sites appear to be located within 8 km (5 mi) of the current project items.

During 1978 - 1979, the Lower Mississippi Valley Survey (LMS) conducted by the Peabody Museum, Harvard University, performed a cultural resources survey on Avery Island and its surrounding areas within the Petite Anse region of southwest Louisiana (Brown 1979:22-670). This region encompassed the southern portions of Iberia, St. Mary, and Vermilion Parishes, an area that measures approximately 6,700 km^2 (2,587 mi^2) in size. The primary intent of the investigation was the documentation of cultural components and their distribution throughout the region. In addition to providing a chronicle of the cultural

history of Avery Island, the investigators also examined the prehistoric migration to the island.

Prior to the survey, a records and literature search was conducted at various facilities, including the Louisiana State archeology files, the Louisiana Antiquities Commission, and Louisiana State University. A total of 64 previously recorded archeological sites were identified. During the classification process, artifacts in the collections were drawn and photographed and aerial photographs were referenced to aid in the identification of previously recorded sites and to produce site maps.

In addition to this work, a non-probabilistic survey was conducted of Salt Mine Valley and Avery Island (Brown 1979). Portions of these areas were plowed and an unspecified number of shovel tests were excavated. Areas identified for survey were selected on the basis of topographic setting, specifically the degree of surface slope, and their proximity to water. As a result of this investigation, 126 archeological sites were documented; these included the 64 previously recorded sites that Brown (1979) identified. Brown (1979) characterized the sites as salt dome sites; Prairie Terrace sites; sites situated along the natural levees of rivers and early distributaries; chenier sites; sites located in the marsh along bayous and lakes; and beach sites. The distribution of sites within the examined portions of Marsh Island, i.e., the eastern half and the northern shore, contained Tchefuncte, Marksville, and Coles Creek cultural components.

An unexpected Mississippian period cultural component was identified at Salt Mine Valley (16IB23), where unit excavation resulted in the recovery of approximately 45,000 artifacts. Subsequent to this discovery, Brown (1979) initiated a second phase of the investigation to examine Plaquemine culture occupation of the Avery Island area. Additionally, the investigations focused on establishing whether or not Mississippian peoples migrated to Avery Island for the express purpose of producing/collecting salt. The survey results supported his hypothesis that an indigenous growth occurred during the transitional Coles Creek/Plaquemine period at Salt Mine Valley. A progression toward the highlands and the salt domes and away from the marshes was noted throughout the region during the transitional phase; thus, activities on Avery Island were naturally developing and not a result of the migration hypothesis. The shift from the marshes was emphasized by a growing dependence on agriculture. In addition, data derived from the survey supplemented the hypothesis that a movement to Avery Island occurred during the Mississippian times; the single purpose focused on the production of salt.

Because the scope of the current project is limited to the extreme northeast portion of Marsh Island, a detailed ethnographic account of the region is not provided here. For a detailed discussion of the ethnography of the region, see Swanton (1911; 1946). The remainder of this chapter focuses on the distribution of previously recorded sites within the region. The discussion presented here includes a review of sites recorded on Marsh Island, as well as those falling within 8.05 km (5 mi) of the coastline and their distribution along Vermilion Bay, East Cote Blanche Bay and West Cote Blanche Bay.

Previously Recorded Sites located within 8 km (5 mi) of the Proposed Project Areas

Although no sites have been recorded within the current project areas, three previously conducted cultural resources surveys and inventories have been undertaken in those portions of Iberia Parish that fall within 8 km (5 mi) of the project reach (Table 10). These investigations were completed by Van Lopik and Saucier (Neuman 1977), McIntire (1954), and Brown (1979). These undertakings resulted in the recordation of six archeological sites (16IB14, 16IB21, 16IB51, 16IB152, 16IB153, and 16IB154) on Marsh Island (Table 11; Figure 19 [located in the back pocket of this report]). Each of these sites is discussed in the next section of this chapter. The information presented below is derived from data included on the submitted State of Louisiana Site Record Form for each identified site.

Previously Recorded Sites on Marsh Island

Site 16IB14 was recorded approximately 8 km (5 mi) southwest of Canal 9 in the south quarter of the southwestern quarter of Section 14, of Township 18S, Range 6E. The site, positioned near the mouth of Oyster Bayou, originally was examined sometime between 1947 and 1954 by

Table 10. Previous Cultural Resources Investigations Completed within 8 km (5 mi) of East and West Cote Blanche Bays and Vermilion Bay.

REPORT NUMBER	REPORT DATE	TITLE/AUTHOR	FIELD METHODOLOGY	RESULTS AND RECOMMENDATIONS
		IBERIA PARISH		
22-0209	1976	*Letter Report: Cultural Resources Survey of Bayside Bridge (In Jeanerette), Route LA 3182, Iberia Parish, Louisiana* (Rivet 1976a)	Pedestrian survey	No cultural resources were identified during survey. No additional testing of the project area was recommended.
22-0364	1978	*Facility Plan Environmental Assessment for Proposed Wastewater Treatment Works to Serve Sewerage District No. 3 of Iberia Parish, Louisiana* (Barry & Associates 1978)	None stated	No cultural resources were cited or identified in the survey. No recommendations were given.
22-0882	1983	*Cultural Resources Survey of the Proposed Kilroy Pipeline, Iberia Parish, Louisiana* (Pearson 1983)	Pedestrian survey, surface collection, and probing	While no previously unrecorded cultural resources were identified, the location of one previously recorded prehistoric period site (16IB112) was revisited. Site 16IB112 appeared to exist only as material found in dredge spoil. The site, however, was located outside of the area of potential effect. No additional testing of Site 16IB112, was recommended.
22-1407	1987	*Historical Archaeology at Marsh House, (Residence Hill Site, 16IB130), Avery Island, Louisiana* (Orser 1987)	Pedestrian survey, shovel testing, mechanical stripping, and unit excavation	Subsurface testing at Marsh House (16IB130) identified cultural material dating post-1880, but the investigation recovered only a small amount of material that predated 1880. No evidence for the pre-1865 occupation of the house was identified. Additional testing of an undetermined nature was recommended.
22-1396	1989	*The Search for the Birthplace of Tabasco Brand Pepper-Sauce: Archaeological Investigations at the Laboratory, Avery Island, Louisiana* (Orser and Babson 1989)	Archival review, pedestrian survey, and unit excavation	Excavations at the Laboratory (16IB135) at Avery Island identified a significant amount of cultural material. The following recommendations were made: All building remains, surface and subsurface, should be delineated and mapped; excavations should be conducted throughout the laboratory itself and on the eastern part of the site; extensive archival research must be conducted into the early history of the McIlhenny Company in order to determine the sequence of events at the Laboratory.
22-1417	1989	*The Avery Island Salt Mine and Village: An Oral History and Architectural Report on Life and Work in South Louisiana* (Babson and Orser 1989)	Archival review, ethnographic interviews, and windshield survey	The report presented the results of archival and ethnographic research in the region surrounding Avery Island. No management recommendations were provided.
22-1418	1989	*An Inventory of Archaeological Sites on Avery Island, Louisiana, 1988* (Babson 1989)	Archival review, pedestrian survey, surface collection, test probing, and shovel testing	A total of 24 prehistoric sites (16IB23-27, IB103/126, IB105, IB113, IB127-128, IB131, IB133-134, IB136-144) 24 historic sites (16IB30-39, IB50, IB53-62, IB104, IB130, IB135, IB159), one multi-component site (16IB129) and one prehistoric locus (Y16IbD) were inventoried as a result of this investigation. Sites 16IB23, IB24 and IB135 were recommended in need of immediate conservation; all other sites were assessed as being in good condition
		ST. MARY PARISH		
22-0032	1976	*Cultural Resources Survey of the Mine Works Area of Cote Blanche Island, Louisiana* (Gagliano et al. 1976)	Archival review and pedestrian survey	No cultural resources were identified. Inspection of the project area after it had been cleared of vegetation was recommended.
22-0147	1976	*Letter Report: Archeological Survey of Four Proposed Construction Sites Related to Drainage and Flood Protection in Drainage District #5, St. Mary Parish, Louisiana* (Gagliano 1976)	Archival review and pedestrian survey	No cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0225	1976	*Letter Report: Cultural Resources Survey of a 0.28 ac Parcel in Charenton St. Mary Parish, Louisiana* (Gibson 1976)	Pedestrian survey	No cultural resources were identified. No additional testing of the proposed project area was recommended.

Table 10, continued

REPORT NUMBER	REPORT DATE	TITLE/AUTHOR	FIELD METHODOLOGY	RESULTS AND RECOMMENDATIONS
22-0244	1976	*Letter Report: Cultural Resources Survey of the Franklin Canal Bridge, Route LA 3052, St. Mary Parish, Louisiana* (Rivet 1976d)	Archival review, pedestrian survey, and auger testing	No cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0245	1976	*Letter Report: A Cultural Resources Survey of the Charenton Drainage and Navigation Canal Bridge* (Rivet 1976c)	Archival review and pedestrian survey	No cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0272	1976	*Letter Report: Cultural Resources Survey of the Lake Palourde By-Pass Roads, St. Mary, Parish* (Rivet, 1976e)	Archival review and pedestrian survey	No cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0355	1977	*Cultural Resources Survey of Proposed Borrow Areas, West Atchafalaya Basin Protection Levee, Levee Enlargement and Berms, St. Mary Parish, Louisiana* (Gibson 1977b)	Archival review and pedestrian survey	No cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0571	1977	*Letter Report: Cultural Resources Survey of the Bayou Onion Bridge, Route LA 304, Lafourche Parish, and Intracoastal Canal Bridge at North Bend, Route LA 317, St. Mary Parish, Louisiana* (Rivet 1977)	Pedestrian survey	No cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0304	1978	*Archaeological Examination of Shaffer Oak Ridge (16SMY50), St. Mary Parish, Louisiana: Evaluation of Impact* (Gibson 1978b)	Pedestrian survey and shovel testing	Site 16SMY50 was evaluated as significant. Avoidance of the site during construction of the proposed project was recommended.
22-0386	1978	*Cultural Resource Survey of the Proposed Relocation Route of U.S. 90 (LA 3052), St. Mary Parish, Louisiana.* (Weinstein et al. 1978) (NOTE: Project area also included Assumption and Terrebonne Parishes)	Pedestrian survey, marine survey, surface collection, shovel testing, and unit excavation	Cultural resources investigations identified 29 sites within the proposed project area. Additional testing was recommended to determine significance.
22-494	1979	*Archaeological Survey of the Proposed Terrebonne Loop Pipeline, Southern Louisiana* (Altschul 1979)	Archival research, pedestrian survey, marine survey, and aerial survey	No cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0511	n.d.	*An Archaeological Survey of a Proposed Salinity Sewerage Project for Franklin and Vicinity, St. Mary Parish, Louisiana* (Neuman n.d.)	Archival review, pedestrian survey, and windshield survey	No cultural resources were identified; no additional testing of the proposed project area was recommended.
22-0512	n.d.	*Archaeological Survey of the Proposed Sewerage Project Area, Baldwin and Vicinity, St. Mary Parish, Louisiana* (Neuman n.d.)	Archival review, pedestrian survey, and windshield survey	No cultural resources were identified; no additional testing of the proposed project area was recommended.
22-0513	n.d.	*Archaeological Survey of the Proposed Sewerage Project Areas, Cypremort Point and Vicinity, St. Mary Parish, Louisiana* (Neuman n.d.)	Archival review, pedestrian survey, and windshield survey	An attempt to revisit Site 16SMY7, located within the proposed project area, failed to relocate the site. No new cultural resources were identified. No additional testing of the proposed project area was recommended.
22-0766	1978	*Reconnaissance of 16SMY6: An Earthen Mound in St. Mary's* (sic) *Parish, Louisiana* (New World Research 1978)	Landowner interview, pedestrian survey, and surface collection	Due to previous modern construction activity and landowner refusal, adequate assessment of Site 16SMY6 was not possible; therefore, a monitoring of the site area was recommended during the initial construction phase to ensure against damage to and proper documentation and evaluation of any intact subsurface cultural resources.

Table 10, continued

REPORT NUMBER	REPORT DATE	TITLE/AUTHOR	FIELD METHODOLOGY	RESULTS AND RECOMMENDATIONS
22-0950	1981	*Cultural Resources Management Survey of Proposed Coast Guard Housing Facilities in St. Mary Parish, Louisiana* (Giardino and Davis 1981)	Archival review, pedestrian survey, surface scraping, judgmental shovel testing, and auger borings	One site (16SMY5) was relocated during survey. Survey and testing of the site indicated that much of it had been already destroyed by wave action, and little indication of subsurface or lateral integrity was found. Site 16SMY5 was assessed as not significant. The proposed project was not expected to impact the entire survey area, and no further investigations were recommended.
22-0966	1984	*Assessment of the Poverty Bayou Site (16SMY160) Belle Isle, St. Mary Parish, Louisiana* (Weinstein 1984)	Archival research, pedestrian survey, and surface collection	Site 16SMY160 consisted of a disturbed surface scatter of both prehistoric and historic period artifacts. No intact cultural remains were identified. The site was assessed as not eligible for inclusion in the National Register of Historic Places, and no further research was recommended.
22-1019	1985	*A Cultural Resource Survey of a Proposed Bulkhead Construction Area on Bayou Boeuf, St. Mary Parish, Louisiana* (deFrance 1985)	Archival research, pedestrian survey, and shovel testing	No impact to the historic cemetery portion of Site 16SMY19 was expected. However, impact to an intact portion of buried prehistoric midden was expected but it was not expected to adversely impact the site, and instead was expected to protect the site from further erosion. No further archeological investigations were recommended.
22-1050	1985	Cultural Resources Survey of the Morgan City and Vicinity Hurricane Protection Project (Goodwin et al. 1985)	Archival research, pedestrian survey, shovel tests	No new archeological sites or historic standing structures were found during the survey. Previously recorded Site 16SMY1 was found to be disturbed by dredging, clearing, deforestation, and erosion. This site was assessed as not significant. No further work was recommended.
22-1053	1985	*An Archeological and Historic Sites Inventory of Bayou Teche between Franklin and Jeanerette, Louisiana* (Goodwin et al. 1985)	Archival research and ethnographic interviews	No new cultural resources were identified. Due to the nature of the survey, no additional testing was recommended.
22-1122	1986	*Cultural Resources Survey of the Wax Lake Outlet Control Weir, Atchafalaya Basin, Louisiana, Project* (Goodwin and Jones 1986)	Archival research, pedestrian survey, shovel tests, and auger testing	No new cultural resources were identified within the Wax Lake Outlet Control Weir project area. Outside of the project corridor, Site 16SMY37 was relocated and identified to have no research potential or significance. No further work was recommended.
22-1194	1988	*Archeological and Historical Research on Avoca Plantation: Testing of Site 16SMY130 and Survey of Proposed Borrow Areas For EABPL Item E-96, St. Mary Parish, Louisiana* (Kelley 1988)	Archival research, pedestrian survey, surface collection, shovel testing, auger boring, backhoe trenching, magnetometer survey, and unit excavation	The initial borrow area survey located no cultural resources. Survey of an alternate borrow area located five historic artifact scatters which appeared to be associated with early twentieth century workers' quarters located on Avoca Plantation. Site 16SMY130 was considered to be eligible for nomination to the National Register of Historic Places.
22-1217	N.D.	*State Project No. 5-01-64 F.A.P. No. HES-342-1(002), Ramos Bayou Bridge, Route U.S. 90, St. Mary Parish* (Deshotels n.d.)	Archival research and pedestrian survey	No new historic or prehistoric sites were located in the project area. Previously recorded Site 16SMY133 was located adjacent to the project area. No further investigation of the project area was recommended.
22-1301	1988	*A Cultural Resources Survey of the Proposed Transcontinental Gas Pipe Line Corporation 20-inch Gas Pipeline Interchange, Lafourche and St. Mary Parishes, Louisiana.* (Heartfield, Price and Greene, Inc., 1988)	Archival research, pedestrian survey, surface collection, and shovel testing	No cultural resources were identified during survey. No additional testing was recommended.
22-1482	1991	*Remote-Sensing Survey of the Atchafalaya Basin Main Channel, Atchafalaya Channel Training Project, St. Mary Parish, Louisiana.* (NOTE: Project area also includes St. Martin Parish)	Remote sensing, diving, and unit excavation	No cultural resources were identified in the lower Atchafalaya Main Channel, either above or below Morgan City. An unspecified number of watercraft or remains of watercraft were identified along Bayou Shaffer.

Table 10, continued

REPORT NUMBER	REPORT DATE	TITLE/AUTHOR	FIELD METHODOLOGY	RESULTS AND RECOMMENDATIONS
22-1502	1991	*Historical and Archeological Investigations of Fort Bisland and Lower Bayou Teche, St. Mary Parish, Louisiana* (Goodwin et al. 1991)	Archival research, magnetometer survey, pedestrian survey, auger testing, shovel testing, metal detector survey, unit excavation, and backhoe trenching	Seven sites were identified, including two antebellum plantation sites (16SMY68 and 16SMY69), four Postbellum and early twentieth century plantation and small landowner sites (16SMY70 - 16SMY73), and one twentieth century site (16SMY67). In addition, a portion of previously identified Bisland Battlefield (16SMY166) was examined. Sites 16SMY70 and 16SMY71 were considered to be significant cultural resources, Site 16SMY69 was recommended for avoidance, and the significance of Site 16SMY73 was not determined. The other sites were considered not significant resources; no further testing was recommended.
22-1527	1991	*Evaluation of Magnetic Anomalies Located in Lower Bayou Teche, St. Mary Parish, Louisiana* (Goodwin et al. 1991)	Archival research, magnetometer survey, fathometer survey, probing, underwater diving, metal detector survey, and jet probe excavation	Eleven previously located magnetic anomalies were revisited. Two of the anomalies could not be relocated. Four of the anomalies were associated with modern debris. One anomaly was identified as an isolated object occuring below the project impact zone. One archeological site (16SMY76) was defined from certain anomalies identified as two wooden barges and some twentieth century bridge remains. A determination of National Register eligibility was recommended for Site 16SMY76 prior to project implementation. No other anomalies warranted further investigation.
22-1542	1991	*Supplemental Archeological Investigations of Lower Bayou Teche, St. Mary Parish, Louisiana* (Goodwin et al. 1991)	Archival research, pedestrian survey, shovel testing, unit excavation, and backhoe trenching	Portions of three previously identified archeological sites (16SMY70, 16SMY71, and 16SMY73) were evaluated, and three new areas along Lower Bayou Teche were surveyed for archeological resources. Two new sites, 16SMY77 and 16SMY78, were identified during survey. The portions of sites 16SMY70, 16SMY73 and 16SMY78 located within the project area did not possess any qualities of significance. Sites 16SMY77 and 16SMY71 did possess qualities of significance and each was recommended for avoidance.
22-1582	1993	*Archeological Testing of the North Bend Site (16SMY132) and Survey of the Todd Area Levee, St. Mary Parish, Louisiana* (Kuttruff et al. 1993)	Archival research, pedestrian survey, shovel testing, unit excavation, and posthole testing	No sites were located in the Todd Levee Area and construction was not expected to have any impact on cultural resources situated in that area. Historic materials recovered from the North Bend Site (16SMY132) were determined to be associated with North Bend Plantation. Although the site as a whole was not eligible for National Register status, that portion of the site within the project area preserved certain potentially significant aspects of plantation life and it was therefore recommended for avoidance.
22-1653	1992	*Level 1 Cultural Resources Survey of 22.349 Acres in St. Mary Parish, Louisiana* (Servello and Blanchard 1992)	Pedestrian survey and shovel testing	No cultural resources were located, and no further investigations were recommended.
22-1908	1995	*A Cultural Resources Survey of Three Alternate Approach Routes for the New Intracoastal Waterway Bridge at Louisa (St. Mary Parish), Louisiana* (Shuman et al. 1995)	Archival research, pedestrian survey, and shovel testing	Two recent artifact scatters were found but were not considered sufficiently old to warrant site status. An attempt to locate previously recorded Site 16SMY134, in the vicinity of the project area, was unsuccessful. Near the project area a house, a cemetery, and a Pentecostal Church were noted but they fell outside of the project area. No further investigations of the proposed project area was recommended.
22-2032	1997	*Phase I Cultural Resources Survey and Inventory of the Proposed Patterson Looping Project, Gulf of Mexico to St. Mary Parish* (Williams et al. 1997)	Archival research, airboat survey, pedestrian survey, shovel testing, and subsurface probing	No significant archeological sites were identified during fieldwork. However, a single locus (A-1) was defined from a single glass shard. This locus may have been the remains of previously recorded Site 16SMY28. No further testing of the project area was recommended.
22-2153	1998	*Phase I Cultural Resources Survey and Inventory of the Proposed ANR Pipeline Company 24 in O.D. Garden City Extension Pipeline Project, St. Mary Parish, Louisiana* (Walter et al. 1998).	Archival research, pedestrian survey, and shovel testing	No cultural resource loci or historic standing strucures were identified either within or near the area of potential effect. No additional testing of the project area was recommended.

Table 10, continued

REPORT NUMBER	REPORT DATE	TITLE/AUTHOR	FIELD METHODOLOGY	RESULTS AND RECOMMENDATIONS
22-2164	1998	*Cultural Resources Investigations of the East and West Bayou Sale Tie-In Levee, St. Mary Parish, Louisiana* (Braud et al. 1998).	Archival research, pedestrian survey, shovel testing, auger testing, backhoe trenching, and unit excavation	Survey of the proposed construction right-of-way did not locate any intact cultural resources. National Register testing at the North Bend Bridge site (16SMY66), located within the project area, demonstrated sufficient site-integrity for nomination to the National Register of Historic Places. Cultural deposits were associated with nearby Site 16SMY132. It was recommended that if these sites could not be avoided during construction, data recovery be undertaken simultaneously at 16SMY66 and 16SMY132.
22-2165	1998	*Cultural Resources Survey of a Borrow Area for the West Atchafalaya Basin Protection Levee, Item W-123, St. Mary Parish, Louisiana* (Braud et al. 1998)	Shovel testing and backhoe trenching	No cultural resources were identified during survey. No additional testing was recommended.
VERMILION PARISH				
22-215	1976	*Letter Report: Freshwater City - Pecan Island, Route LA 3147, Vermilion Parish* (Rivet 1976b)	Archival research and surface collection	No cultural resources were identified during survey. No additional testing was recommended.
22-669	1981	*The Morgan Site: An Important Coles Creek Mound Complex on the Chenier Plain of Southwest Louisiana* (Brown 1981)	Archival research, shovel testing, and unit excavations	Cultural resources investigations of the Morgan Site (16VM9), designated 34-G-2 by the investigators, identified multiple areas of intensive occupation. Subsequent testing of a midden and a mound demonstrated that the mound (Mound 1) dated from the Late Coles Creek period. Additional testing was recommended for the site.
22-806	1982	*A Cultural Resources Survey of the Proposed Dredging of Canal and Slip Belle Isle Lake, Vermilion Parish, Louisiana* (Frank 1982)	Archival research, pedestrian survey, marine survey, aerial survey, and surface collection	Site 16VM115 was revisited; Site 16VM100 could not be relocated. The investigators concluded that sites 16VM100 and 16VM115 were the same site. Site 16VM115 was located outside the proposed project area, and therefore would not be impacted. No additional testing of the proposed project area was recommended.
22-934	1984	*Cultural Resources Survey of a Proposed Pipeline, Vermilion Parish, Louisiana* (Campbell 1984)	Archival research, pedestrian survey, boat survey, and shovel testing	Four shell deposits were inspected and determined to be redeposited. Previously recorded Site 16VM118 was located in the southern portion of the project area and it was assessed as potentially significant. Avoidance or further testing of the site was recommended.
22-1236	1987	*Archaeology at the Morgan Site Mound Complex in Southwest Louisiana, 1986* (Fuller and Fuller 1987)	Block excavation and trenching	Excavations were conducted at Mound 1 at a time when the site mounds were being destroyed by the landowner. These excavations revealed a submound midden, a slope midden, and a summit house floor. A large circular structure pattern was uncovered on the summit and associated with a central hearth complex, a series of secondary hearths, and several pits. Pottery suggested a Middle Coles Creek date for the submound occupation and a Middle to Late Coles Creek date for the mound.
MULTIPLE PARISHES				
22-105	1975	*Archeological Survey of Bayou Teche, Vermilion River, and Freshwater Bayou, South Central Louisiana* (Gibson 1975)	Pedestrian survey	Cultural resources investigations resulted in the identification of 38 archeological sites (16IB2, 16LY1-7, 16LY10, 16LY12-14, 16LY22-26, 16LY28-29, 16SL2, 16SL31, 16VM7, 16VM11, 16VM15-17). Settlement pattern analysis identified a number of variables as potentially favorable for possible site settlement. Additional research and testing of the Vermilion Basin was recommended to allow for a broader understanding of the region's archeological resources.

Table 10, continued

REPORT NUMBER	REPORT DATE	TITLE/AUTHOR	FIELD METHODOLOGY	RESULTS AND RECOMMENDATIONS
22-106	1975	*Archeological Investigations Along the Gulf Intracoastal Waterway: Coastal Louisiana Area* (Gagliano et al. 1975)	Archival research, pedestrian survey, marine survey, and surface collection	Cultural resources investigations identified 150 prehistoric sites and 42 historic sites in the vicinity of the waterways and bayous associated with the Gulf Intracoastal Waterway in Louisiana. A total of eight sites (16IB110-111, 16SMY42, SMY132, SMY134, 16VM33, 16VM35-36) are located in the predictive model's survey area. Of the eight sites found within the predictive model survey area, no additional work is recommended for Site 16SMY132. Additional work is recommended for the seven remaining sites.
22-211	1976	*Letter Report: Ivanhoe-Jeanerette Highway, Route LA 3145, St. Mary and Iberia Parishes* (Rivet 1976f)	Archival research and marine survey	No cultural resources were identified during survey. No additional testing was recommended.
22-341	1977	*Cultural Resources Survey of Sewerage System, Town of Delcambre, Iberia and Vermilion Parishes, Louisiana* (Gibson 1977a)	Archival research, windshield survey, and pedestrian survey	No cultural resources were identified during survey. No additional testing was recommended.
22-1151	1979	*A Cultural Resources Survey of the Proposed Erath-Weeks Island Pipeline Route* (Swanson 1979)	Archival research, pedestrian survey, and aerial survey	A single historic site (no number stated) was identified as a result of the cultural resources survey. Avoidance of the site by rerouting the proposed pipeline was recommended.
22-1021	1981	*Cultural Resource Survey, Louisiana Section of Proposed Pipeline Corridor from Weeks Island to Mississippi Border* (McIntire 1981)	Archival research, pedestrian survey, aerial survey, shovel testing, and auger testing	Three previously identified cultural resources (16AS5, 16AS14, 16AS17) were revisited during survey; only 16AS14 could be relocated. No additional cultural resources were identified. No additional testing was recommended.
22-619	1982	*Archeology and Ethnology on the Edges of the Atchafalaya Basin, South Central Louisiana* (Gibson 1982)	Ethnographic research, archival research, pedestrian survey, unit excavation, auger testing	Cultural resources investigations resulted in the identification of 33 prehistoric and historic archaeological sites (16AV68, 16AV69, Y16Ibe, Y16Ibf, 16IV4, 16SL60-16SL64, 16SM6?, 16SM45, 16SM48, 16SM50-16SM52, 16SMY2, 16SMY39, 16SMY51-16SMY54, 16SMY104, 16SMY106-SMY108, 16SMY130, SMY163-16SMY166) within the Atchafalaya Basin associated with levee areas. A total of 12 sites (16AV68, 16AV69,16SM45, 16SM50, 16SM51, 16SMY2, 16SMY52, 16SMY104, 16SMY107, 16SMY130, 16SMY166, and 16IV4) were recommended for additional testing.
22-1279	1977	*Petite Anse Project, Research Notes Number 1.* (includes *Research Notes* numbers 1-12, Peabody Museum, Harvard (Brown 1977)	Archival research, shovel testing, and unit excavations	This report covers multiple surveys and site excavations conducted by the Lower Mississippi Survey of Peabody Museum, Harvard University. It was presented as an attempt to create a chronology of the Five Island Area of the Louisiana Gulf Coast. Interpretations of numerous sites recorded during the 1970's and earlier can be found in the report. This report should be consulted on a site-by-site basis.
22-1486	1990	*Trunkline Gas Company Proposed Bayou Sale Loop 20-Inch O.D. Pipeline Project, Vermilion, Iberia, and St. Mary Parishes, Louisiana* (Wojtala et al. 1990)	Archival research, pedestrian survey, and shovel testing	Twenty-one cultural resources loci were identified, 14 of which were designated as sites (16VM128-140, 16SMY74). Only Site 16SMY74 is located within the sampling area of the predictive model. Site 16SMY74 was not recommended for additional testing.

Table 11. Sites Located within 8 km (5 mi) of the Project Area.

SITE NUMBER	7.5' QUAD	SECTION, TOWNSHIP, RANGE	UTM LOCATION	CULTURAL AFFILIATION	SITE DESCRIPTION	LANDFORM	SOIL CHARACTER	NEAREST WATER SOURCE	ELEVATION	METHODOLOGY	NATIONAL REGISTER ELIGIBILITY	RECORDER
IBERIA PARISH												
16IB14	Mound Point	South part of SW 1/4 of Section 14, T18S, R6E	3260740 N 614360 E	Coles Creek	Prehistoric ceramic scatter	Chenier	Scatlake Association - very poorly drained organic soils	On bank of Oyster Bayou	< 1.5 m (5 ft) AMSL	Surface collection	Unknown	Brown and Fuller 1979
16IB21	Bayou Lucien	Section 32, T16S, R5E	3275615 N 600623 E	Neo-Indian	Prehistoric ceramic scatter	Beach deposit	Lafitte Association - very poorly drained organic soils	On bank of Vermilion Bay; ca. 350 m (1148 ft) north of unnamed bayou	< 1.5 m (5 ft) AMSL	Surface collection	Unknown	Van Lopik and Saucier 1952
16IB51	Bayou Lucien	NW 1/4 of SW 1/4 of Section 19, T17S, R5E	3269025 N 598121 E	Coles Creek	Prehistoric ceramic scatter	Chenier	Placedo Association - very poorly drained clayey soils	On shore of Gulf of Mexico; ca 1.2 km (.75 mi) south of unnamed ponds	< 1.5 m (5 ft) AMSL	Surface collection	Unknown	McIntire, Morgan, Russell 1951
16IB152	Bayou Lucien	SW 1/4 of NW 1/4 of Section 33, T16S, R5E	3275594 N 601419 E	Tchefuncte and Marksville	Prehistoric secondary artifact deposit	Beach	Lafitte Association - very poorly drained organic soils	On shore of Vermilion Bay; 500 m (1640 ft) north of Bayou Chene	< 1.5 m (5 ft) AMSL	Surface collection	Unknown	Brown and Fuller 1979
16IB153	Bayou Lucien	SE 1/4 of NW 1/4 of Section 33, T17S, R5E	3275728 N 601815 E	Tchefuncte	Prehistoric secondary artifact deposit	Beach	Lafitte Association - very poorly drained organic soils	On shore of Vermilion Bay; 500 m (1640 ft) NW of Bayou Chene	< 1.5 m (5 ft) AMSL	Surface collection	Unknown	Brown and Fuller 1979
16IB154	Cyprem ort Point	S 1/4 of the NW 1/4 of Section 23, T16S, R5E	3278286 N 604695 E	Neo-Indian	Prehistoric secondary artifact deposit	Beach	Lafitte Association - very poorly drained organic soils	On bank of feeder to Bayou Michael	< 1.5 m (5 ft) AMSL	Surface collection	Unknown	Brown and Fuller 1979

McIntire (1954) who characterized the site as a prehistoric shell midden of unknown origin (State of Louisiana Site Record Form 16IB14). During a subsequent (1979) investigation of the site, Brown (1979) recovered an unspecified number of Baytown Plain *var. unspecified* and one Pontchartrain Check Stamped *var. Pontchartrain* sherds. No management recommendations were contained in the submitted site form (State of Louisiana Site Record Form 16IB14).

Site 16IB21 originally was recorded by Van Lopik and Saucier in 1952; it is located in Section 32, of Township 16S, Range 5E (State of Louisiana Site Record Form 16IB21). This prehistoric site was situated on the northern side of Marsh Island approximately 1.6 km (1 mi) west of the mouth of Bayou Chene. Van Lopik and Saucier characterized the site as a "beach deposit" from which an unspecified number of prehistoric ceramic sherds and shell were recovered. The site was assigned a post-Archaic period cultural affiliation. No management recommendations were provided on the submitted site form (State of Louisiana Site Record Form 16IB21).

Site 16IB51 was located in the northwest portion of the southwest quarter of Section 19, of Township 17S, Range 5E. The site, originally examined by McIntire, Morgan, and Russell in 1951, and later revisited by Brown in 1979, was characterized as prehistoric cultural material originating from a beach deposit (State of Louisiana Site Record Form 16IB51). Site 16IB51 was assigned a Coles Creek cultural affiliation; this interpretation was based on the recovery of 12 Baytown Plain *var. unspecified* and 1 Pontchartrain Check Stamped *var. Pontchartrain* ceramic sherds. No management recommendations or assessments of probable research potential were included on the site form (State of Louisiana Site Record Form 16IB51).

Site 16IB52 was located in the southwest portion of the northwest quarter of Section 33, of Township 16S, Range 5E. Originally examined by Brown and Fuller in 1979, cultural material and ecofacts recovered from the site included an unspecified number of Baytown Plain *var. unspecified*, Marksville Stamped *var. unspecified*, French Fork Incised *var. unspecified*, and Coles Creek Incised *var. unspecified* ceramic sherds, and a substantial amount of *Rangia* and, to a lesser degree, *Ostrea* shell (State of Louisiana Site Record Form 16IB52). Although the function of Site 16IB52 was not discernible, the material recovered from the site suggested a Tchefuncte and Marksville cultural affiliation. Brown and Fuller reported that Site 16IB52 was destroyed by coastal erosion and wave action. No recommendations for further work were suggested (State of Louisiana Site Record Form 16IB52).

Site 16IB53 was recorded by Brown and Fuller in 1979; it was identified in the southeast quarter of the northwest quarter of Section 33, of Township 17S, Range 5E. The site was assigned a Tchefuncte cultural affiliation based on the recovery of an unspecified number of Baytown Plain *var. unspecified* ceramic sherds. A substantial amount of *Rangia* and *Ostrea* shell also was deposited along the beach throughout this portion of the site. No management recommendations were included on the submitted site form (State of Louisiana Site Record Form 16IB53).

Site 16IB154 was located in the south portion of the northwest quarter of Section 23, of Township 16S, Range 5E; it also was recorded by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16IB154). The site was described as a secondary shell deposit situated at the mouth of Bayou Michael and on the northwest shore of Marsh Island. Only one Baytown Plain ceramic sherd was recovered from the site and it was assigned a post-Archaic period cultural affiliation. No management recommendations were included on the submitted site form (State of Louisiana Site Record Form 16IB154).

Previously Recorded Sites Located within 8 km (5 mi) of the East Cote Blanche Bay, West Cote Blanche Bay, and Vermilion Bay Shorelines

A number of cultural resources surveys and inventories have been completed within 8 km (5 mi) of the shorelines of East Cote Blanche Bay, West Cote Blanche Bay, and Vermilion Bay in portions of Iberia, St. Mary, and Vermilion Parishes (Table 12; Figure 19 [located in the back pocket of this report]). A total of 85 prehistoric period sites, 9 historic period sites, and 4 multicomponent prehistoric/historic period sites were recorded as a result of these surveys. Each of these sites is discussed below; the site descrip-

Table 12. Sites Located within 8 km (5 mi) of Shoreline of East and West Cote Blanche Bays and Vermilion Bay.

SITE NUMBER	7.5' USGS QUAD	CULTURAL AFFILIATION	SITE DESCRIPTION	METHODOLOGY	NRHP ELIGIBILITY	RECORDER
IBERIA PARISH						
16IB3	Weeks	Tchefuncte, Marksville, Troyville, Coles Creek and Plaquemine. Possible Archaic component.	Large prehistoric shell midden	Surface collection	Unknown	De Le Blanc 1940
16IB102	Weeks	Unknown Prehistoric	Prehistoric artifact scatter; possible village camp	Surface collection	Unknown	Simmons 1966
16IB110	Tigre Lagoon	20th Century	Historic campsite	Surface collection	Unknown	Burden and Weinstein 1975
16IB111	Weeks	Coles Creek	Prehistoric scatter	Surface collection	Unknown	Weinstein and Burden 1975
16IB124	Point Chevrauil	Unknown Prehistoric	Prehistoric shell midden	Surface collection, corings	Unknown	McIntire, Morgan, Kniffen and Warren 1952
16IB145	Tigre Lagoon	Late Coles Creek, Early Plaquemine	Prehistoric ceramic scatter; remains of shell mound	Surface collection	Unknown	Brown and Fuller 1978
16IB146	Weeks	Unknown Prehistoric	Prehistoric lithic scatter	Surface collection, auger testing	Unknown	Brown and Fuller 1979
16IB147	Weeks	Neo-Indian	Prehistoric artifact scatter	Surface collection	Unknown	Brown and Fuller 1979
ST. MARY PARISH						
16SMY3/38	Hammock Lake	Unknown Prehistoric	Prehistoric mound complex and shell midden	Surface collection	Unknown	LSU n.d.
16SMY6	Point Chevrauil	Coles Creek, Plaquemine	Prehistoric mound with ceramic scatter	Surface collection	Unknown	Kniffen and Russell 1952
16SMY7	Hammock Lake	Coles Creek, Plaquemine (Caddoan component)	Prehistoric shell midden and mound	Surface collection	Unknown	LSU 1952
16SMY11	Hammock Lake	Tchefuncte-Mississippian, unknown Neo-Indian	Prehistoric shell midden	Surface collection	Unknown	LSU 1952
16SMY17	Point Chevrauil	Neo-Indian	Prehistoric shell midden and burials	Surface collection	Unknown	McIntire and Warren 1952
16SMY27	Belle Isle	Neo-Indian	Prehistoric shell midden	Surface collection	Unknown	McIntire, Kniffen, Morgan and Warren 1952
16SMY31	North Bend	Coles Creek, Mississippian	Prehistoric midden	Surface collection	Unknown	McIntire, Warren, Kniffen 1952
16SMY32	Belle Isle	Unknown prehistoric	Prehistoric shell midden	Surface collection	Unknown	McIntire and Warren 1952
16SMY33	Belle Isle	Unknown	Temporally and culturally unidentified shell midden	Surface collection	Unknown	McIntire 1952
16SMY35	North Bend	Unknown prehistoric	Prehistoric shell midden	Surface collection	Unknown	McIntire and Hessland 1952

Table 12, continued

SITE NUMBER	7.5' USGS QUAD	CULTURAL AFFILIATION	SITE DESCRIPTION	METHODOLOGY	NRHP ELIGIBILITY	RECORDER
16SMY40	Point Chevrauil	Neo-Indian	Secondary prehistoric artifact scatter	Surface collection	Not eligible	Claire Brown n.d.
16SMY42	Ellerslie	Marksville and Coles Creek	Prehistoric shell midden and possible camp	Surface collection	Unknown	McIntire and Van Lopik 1953
16SMY66	North Bend	Mid nineteenth to early twentieth century	Historic quarters complex	Pedestrian survey, shovel tests, auger tests, backhoe trenches	Eligible	Rivet 1978; McGimsey 1995; Braud 1997
16SMY74	Kemper	Nineteenth and twentieth centuries	Historic scatter of artifacts probably related to a dwelling 150 m to the northwest	Pedestrian survey, shovel tests	Not eligible	Wojtala and Morgan 1990
16SMY79	Marone Point	Paleo-Indian, Late Archaic, Baytown	Prehistoric artifact scatter	Pedestrian survey	Eligible	Marckese 1993
16SMY100	Kemper	Marksville, Troyville, Coles Creek, Plaquemine	Prehistoric camp	Surface collection	Unknown	Burden 1975; Brown and Fuller 1979
16SMY101	Kemper	Plaquemine, unknown Neo-Indian	Prehistoric shell midden	Surace collection, shovel tests	Unknown	Simmons 1966; Burden 1975
16SMY102	Belle Isle	Poverty Point/ Tchefuncte	Redeposited prehistoric midden	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY103	Belle Isle	Mississippian, unknown Neo-Indian	Prehistoric shell midden	Surface collection, shovel tests	Unknown	Simmons 1966
16SMY118	Point Chevrauil	Baytown	Prehistoric artifact scatter	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY132	North Bend	Nineteenth and twentieth centuries; possibly Tchefuncte component	Historic plantation and sugar mill; unidentified prehistoric	Surface collection	Unknown	Russo 1993; Weinstein and Burden 1975
16SMY134	Weeks	Destroyed prehistoric site	Unknown; only modern features reported	Pedestrian survey, shovel tests	Not eligible	Shuman 1995; Weinstein and Burden 1975
16SMY150	Hammock Lake	Tchefuncte and Coles Creek	Prehistoric ceramic scatter; possible shell extraction area	Surface collection	Unknown	McIntire 1952
16SMY151	Hammock Lake	Unknown	Redeposited prehistoric site	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY152	Ellerslie	Coles Creek	Redeposited prehistoric artifact scatter	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY153	Ellerslie	Coles Creek	Prehistoric artifact scatter	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY154	Ellerslie	Tchefuncte, Marksville, Coles Creek	Destroyed prehistoric ceramic scatter	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY155	Point Chevrauil	Possible Tchefuncte	Destroyed and redeposited prehistoric artifact scatter	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY156	Marone Point	Undetermined prehistoric	Destroyed prehistoric artifact scatter	Pedestrian survey	Unknown	Brown and Fuller 1979

Table 12, continued

SITE NUMBER	7.5' USGS QUAD	CULTURAL AFFILIATION	SITE DESCRIPTION	METHODOLOGY	NRHP ELIGIBILITY	RECORDER
16SMY157	Point Chevrauil	Coles Creek, possible Late Archaic or Poverty Point	Prehistoric artifact scatter	Pedestrian survey	Unknown	Fuller 1979
16SMY158	Point Chevrauil	Undetermined prehistoric	Prehistoric artifact scatter	Pedestrian survey	Unknown	Fuller 1979
16SMY159	Ellerslie	Undetermined prehistoric	Prehistoric lithic scatter; possible lithic workshop	Pedestrian survey	Not eligible	McGimsey 1995; Fuller 1979
16SMY160	Belle Isle	Undetermined prehistoric; nineteenth century	Mixed prehistoric and historic artifacts washing out from a hill	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY161	Belle Isle	Undetermined prehistoric; nineteenth century	Single prehistoric Baytown Plain ceramic; scatter of 19th century material possibly associated with quarters of Jean Lafitte	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY162	Belle Isle	Undetermined Prehistoric	Prehistoric artifact scatter	Pedestrian survey	Unknown	Brown and Fuller 1979
16SMY167	Belle Isle	Late 19th Century	Historic brick bulkheads for old landing; possible saw mill	Boat and aerial survey	Possible; needs additional work	Weinstein 1984
16SMY168	Belle Isle	19th Century	Historic cemetery	Informant reported	Unlikely	Weinstein 1984
16SMY172	Franklin	Coles Creek; Unknown historic	Mixed prehistoric and historic artifact scatter	Pedestrian survey and shovel testing	Not eligible	Yakubik et al. 1985
16SMY173	Franklin and Charenton	Late 19th Century	Historic artifact scatter	Surface collection, shovel testing	Not eligible	Yakubik et al. 1985
16SMY177	Franklin	Late 19th - mid 20th Century	Historic artifact scatter	Pedestrian survey, shovel testing	Not eligible	Yakubik et al. 1985
VERMILION PARISH						
16VM1	Redfish Point	Unknown prehistoric	Prehistoric shell midden	Surface collection	Not eligible	Saucier and Van Lopik 1952
16VM2	Intracoastal City	Unknown prehistoric	Prehistoric shell midden	Surface collection, shovel testing	Unknown	Louisiana State University 1952
16VM3	Redfish Point	Tchefuncte, Coles Creek, Late Plaquemine	Prehistoric redeposited clam shell midden and possible campsite	Surface collection	Unknown	McIntire and Van Lopik 1953
16VM5	Intracoastal City	Neo-Indian	Prehistoric artifact scatter	Surface collection	Unknown	McIntire 1951
16VM11	Fearman Lake	Coles Creek	Prehistoric shell midden and possible campsite	Surface collection	Unknown	McIntire, Morgan and Russell 1951
16VM12	Fearman Lake	Tchefuncte, Marksville, Coles Creek	Prehistoric scatter and possible camp	Surface collection	Unknown	McIntire, Morgan and Russell 1951
16VM15	Cheniere au Tigre	Neo-Indian	Prehistoric scatter and possible campsite	Surface collection	Unknown	McIntire 1951

Table 12, continued

SITE NUMBER	7.5' USGS QUAD	CULTURAL AFFILIATION	SITE DESCRIPTION	METHODOLOGY	NRHP ELIGIBILITY	RECORDER
16VM16	Intracoastal City	Coles Creek, Plaquemine	Prehistoric shell midden and possible camp or hamlet/ village	Surface collection	Not eligible	McIntire and Saucier 1952
16VM17	Hebert Lake	Coles Creek	Prehistoric shell midden and possible camp	Surface collection; excavations	Unknown	McIntire and Saucier 1952
16VM18	Hebert Lake	Coles Creek	Four separate shell deposits around lagoon; possible prehistoric camp/ extraction locale	Surface collection	Unknown	McIntire and Saucier 1952
16VM19	Hebert Lake	Coles Creek	Prehistoric redeposited artifact scatter and shell midden	Surface collection; cutbank examination	Not eligible	McIntire and Saucier 1952; Exnicios 1993
16VM20	Hebert Lake	Neo-Indian	Prehistoric shell mound and probable camp/ extraction locale	Surface collection	Unknown	McIntire and Saucier 1952
16VM21	Fearman Lake	Unknown prehistoric	Prehistoric shell midden	Surface collection	Unknown	Saucier and Van Lopik 1952
16VM22	Fearman Lake	Transitional Coles Creek, Plaquemine	Prehistoric shell midden and possible camp	Surface collection	Unknown	McIntire et al. 1952
16VM23	Fearman Lake	Neo-Indian	Prehistoric shell middens and artifact scatter	Surface collection	Unknown	Saucier and Van Lopik 1952
16VM24	Hellhole Bayou	Tchefuncte, Marksville, Coles Creek, Plaquemine	Prehistoric shell midden and burial	Surface collection	Unknown	Saucier and Van Lopik 1952
16VM25	Fearman Lake	Unknown	Questionable prehistoric shell midden	Surface collection	Unknown	Van Lopik 1952
16VM26	Tigre Lagoon	Tchefuncte, Troyville, Coles Creek, Plaquemine	Prehistoric shell midden and possible camp	Surface collection	Unknown	McIntire and Saucier 1952
16VM28	Hellhole Bayou	Unknown prehistoric	Prehistoric shell midden	Shovel testing	Unknown	McIntire, Morgan and Warren 1952
16VM29	Hellhole Bayou	Unknown prehistoric	Prehistoric shell midden	Surface collection	Unknown	McIntire, Saucier and Van Lopik 1952
16VM32	Cheniere au Tigre	Possible prehistoric; possible natural feature	Prehistoric shell midden or natural accumulation	Surface collection	Unknown	McIntire and Van Lopik 1953
16VM33	Intracoastal City	Coles Creek, Plaquemine	Prehistoric shell midden and possible campsite	Surface collection	Unknown	McIntire and Van Lopik 1953
16VM35	Intracoastal City	Neo-Indian	Prehistoric shell accumulation and isolate ceramic	Surface collection	Unknown	Weinstein and Burden 1975
16VM36	Intracoastal City	Marksville	Prehistoric shell midden and possible campsite	Surface collection	Unknown	Weinstein and Burden 1975

Table 12, continued

SITE NUMBER	7.5' USGS QUAD	CULTURAL AFFILIATION	SITE DESCRIPTION	METHODOLOGY	NRHP ELIGIBILITY	RECORDER
16VM100	Fearman Lake	Troyville, Coles Creek, Plaquemine	Prehistoric shell midden and possible campsite	Unknown	Unknown	Simmons 1966
16VM103	Hellhole Bayou	Prehistoric	Shell midden	Surface collection	Unknown	Weinstein 1976
16VM105	Hebert Lake	Coles Creek; Plaquemine	Prehistoric shell midden and possible campsite	Surface collection	Unknown	Brown and Fuller 1979; Russo 1993
16VM106	Hebert Lake	Neo-Indian (Probably Coles Creek)	Prehistoric shell mound and shell midden and possible campsite	Surface collection	Unknown	Brown and Fuller 1979; Russo 1993
16VM107	Hebert Lake	Coles Creek	Prehistoric shell midden and mound; probable campsite	Surface collection	Unknown	Brown and Fuller 1979
16VM108	Hebert Lake	Unknown Neo-Indian	Prehistoric shell midden; probable campsite	Surface collection	Unknown	Brown and Fuller 1979
16VM114	Fearman Lake	Coles Creek and possible transitional Coles Creek/ Plaquemine	Prehistoric shell midden	Surface collection	Unknown	Brown 1978
16VM115	Fearman Lake	Marksville, Coles Creek, transitional Coles Creek/ Plaquemine, possible Troyville	Prehistoric shell midden; probable campsite	Surface collection	Unknown	Simmons 1966
16VM116	Cheniere Au Tigre	Coles Creek	Prehistoric artifact scatter	Surface collection	Unknown	Brown and Fuller 1979
16VM117	Redfish Point	Unknown prehistoric (Gary point), possible Coles Creek, unknown historic	Mixed prehistoric and historic surface scatter	Surface collection	Unknown	Brown and Fuller 1979
16VM118	Hellhole Bayou	Possible Coles Creek	Prehistoric shell midden	Pedestrian survey, shovel tests	Unknown	Thomas 1984; McIntire et al. 1952
16VM127	Intracoastal City	Mid to late nineteenth century	Historic plantation overseer residence and brick kiln	Pedestrian survey, surface collection, shovel tests, test unit excavations	Unknown	Gibson 1976
16VM146	Intracoastal City	Unknown prehistoric; Antebellum and Civil War	Prehistoric artifact scatter; Historic Antebellum and Civil War	Shovel tests, posthole tests, metal detector survey	Unknown	Hardy and McGimsey 1997; Saunders 1993

tions were compiled from data contained in the State of Louisiana Site Record Forms for each site.

Iberia Parish

Site 16IB3 originally was recorded by De Le Blanc in 1940 and it is located in Section 37, of Township 14S, Range 6E. The site also was revisited a number of times between 1952 and 1979 by McIntire, Neuman, Byrd, McIntire and Burdern, Brown and Fuller, and Gagliano (State of Louisiana Site Record Form 16IB3, Neuman 1972, 1977; Gagliano et al. 1975, 1976). The site was recorded adjacent to Weeks Bayou and on the extreme northwest edge of Week's Island. The site also was called the Morton Shell Mound and it was described as "a large mound, largest still extant in the region" (State of Louisiana Site Record Form 16IB3). The recovery of approximately 561 ceramic sherds by Brown and Fuller in 1979, and the collection of an unknown quantity of stone and bone artifacts by Neuman in 1977 (State of Louisiana Site Record Form 16IB3) suggest that the site was occupied by Tchefuncte, Marksville, Troyville, Coles Creek and Plaquemine cultural groups. During an investigation of Site 16IB3 by Gagliano et al. (1975), an unknown number of artifacts were recovered; this material apparently dated from the Archaic Stage (Gagliano et al. 1975). Although the site reportedly was eroding rapidly, no specific management recommendations or assessment of research potential was provided in the site form (State of Louisiana Site Record Form 16IB3).

Located just to the northeast of Sandy Bottom Pond in the northeast quarter of irregular Section 48, of Township 14S, Range 7E, Site 16IB102 was recorded by Simmons in 1966. The site was revisited between 1969 and 1979 by Neuman and Simmons, Burden, and Brown and Fuller (State of Louisiana Site Record Form 16IB102, Gagliano et al. 1976). The site was described as a "prehistoric scatter" of "projectile points [and] chipping debris" of "unknown" cultural affiliation. The site was characterized as a "village camp associated with [the] salt dome" on which it was located (State of Louisiana Site Record Form 16IB102).

In 1975, Burden and Weinstein recorded Site 16IB110 on an old levee positioned along the bank of an unnamed bayou located near the intersection of Bayou Cassmer and the Intracoastal Canal. The site was identified within Section 48 of Township 14S, Range 6E and it was characterized as a "historic campsite"; this interpretation was based on the recovery of large amounts of charcoal, shell, and wood (State of Louisiana Site Record Form 16IB110). Although the site contained a 12.7 cm (5 in) thick lens of eroding shell and an associated midden that extended for approximately 45 - 61 m (150 - 200 ft) along the bank of the bayou, no cultural material was recovered. Site 16IB110 was recommended for further investigation, yet its National Register significance was reported as unknown (State of Louisiana Site Record Form 16IB110).

Site 16IB111 was located in Section 30, of Township 14S, Range 6E; it was recorded by Weinstein and Burden in 1975 and reinvestigated by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16IB111; Gagliano et al 1975). Investigations within the site produced an undisclosed amount of shell and bone, as well as a single "Pontchartrain Check Stamped ceramic rimsherd" (State of Louisiana Site Record Form 16IB111). Based on the recovery of the ceramic artifact, the site was assigned a "Coles Creek" cultural affiliation; the function of the site, however, was listed as "unknown" (State of Louisiana Site Record Form 16IB111). Site 16IB111 was situated near an unnamed bayou as well as near the Intracoastal Waterway, both of which were causing erosion of the identified shell deposits. While Site 16IB111 was recommended for additional investigation, the National Register significance of the site was not assessed (State of Louisiana Site Record Form 16IB111).

Site 16IB124 was identified approximately 4 km (2.5 mi) southwest of Point Chevreuil in East Cote Blanche Bay; the site also is known as the Rabbit Island Site because it extends along the entire length of Rabbit Island. The location of the site was listed as Township 17S, Range 6E. The site consisted solely of reworked shell, and no cultural midden or evidence of *in-situ* cultural material was identified as a result of the investigation. Although the site was classified as pre-

historic in character, its cultural affiliation and function were recorded as unknown. Likewise, the National Register significance of Site 16IB124 was listed as unknown (State of Louisiana Site Record Form 16IB124).

Site 16IB145 was identified by Brown and Fuller in 1978; it was located on the north shore of Vermilion Bay in Section 6, of Township 14S, Range 6E. The site was characterized as "a large shell mound, now destroyed" (State of Louisiana Site Record Form 16IB145). The recovery of Mazique Incised, Pontchartrain Check Stamped, Plaquemine Brushed, Harrison Bayou Incised, and Baytown Plain ceramics suggested that the site dated from the late Coles Creek and early Plaquemine cultural periods. The National Register significance and research potential of Site 16IB145 were reported as unknown (State of Louisiana Site Record Form 16IB145). No recommendations for Site 16IB145 were recorded on the submitted site form.

Site 16IB146 was recorded by Brown and Fuller in 1979. The site was identified in the northwest portion of the southeast quarter of Section 48, of Township 14S, Range 6E, and in the west central portion of Weeks Island, i.e., approximately 400 m (1312 ft) southeast of Sandy Bottom Pond (State of Louisiana Site Record Form 16IB146). Cultural material identified at the site included a light scatter of non-diagnostic chert flakes and chipped pebbles, including 1 bifacially chipped pebble. The National Register significance of Site 16IB146 was listed as unknown and no recommendations for further work were listed on the completed site form (State of Louisiana Site Record Form 16IB146).

Brown and Fuller reported on Site 16IB147 in 1979. This site was located on the southwest edge of Weeks Island between Bayou Garrett and Two Mouth Bayou, in Township 14S, Range 6E. The site consisted of a "heavy deposit of *Rangia* shell with some *Ostrea* dredged up as a result of Intracoastal waterway construction" (State of Louisiana Site Record Form 16IB147). Artifacts recovered from the site consisted primarily of Baytown Plain ceramics; this led to its assignment to the "Neo-Indian" cultural period (State of Louisiana Site Record Form 16IB147). The National Register significance of Site 16IB147 was listed as unknown and no recommendations for additional testing were recorded on the submitted site form.

St. Mary Parish

Site 16SMY3 was located on the shore of West Cote Blanche Bay and it was recorded at an unknown date by Louisiana State University (State of Louisiana Site Record Form 16SMY3). The site, located in Township 15S, Range 6E, was reported variously as a prehistoric mound complex and/or shell midden. No artifacts were reported and the National Register significance of Site 16SMY3 was listed as unknown (State of Louisiana Site Record Form 16SMY3). No recommendations for further work were recorded on the submitted site form.

Site 16SMY6 was recorded by Kniffen and Russell in 1952; it was identified in Section 9, of Township 17S, Range 9E. The site also was visited by Saucier and McIntire in 1953 and by Fuller and Lambert-Brown in 1979 (State of Louisiana Site Record Form 16SMY6). Site 16SMY6 was characterized as a prehistoric Coles Creek and Plaquemine period earth mound located on the bank of Bayou Sale. Material recovered from the site included 269 clay-tempered sherds, 8 sand-tempered sherds, 1 Pontchartrain Check Stamped sherd, and 5 unidentified ceramic sherds (Neuman 1977; Sires 1978; and Britsch et al. 1985). Site 16SMY6 was characterized as possibly destroyed; the National Register significance of the site was listed as unknown, and no recommendations for further work were provided on the submitted site form (State of Louisiana Site Record Form 16SMY6).

Site 16SMY7 was located in Section 20, of Township 16S, Range 12E, and it was recorded in 1952 by Louisiana State University (State of Louisiana Site Record Form 16SMY7). The site, situated on the bank of Bayou Cypremort, was described as a prehistoric "shell midden [and] mound" that produced both "Coles Creek [and] Plaquemine (Caddoan component)" cultural material (State of Louisiana Site Record Form 16SMY7; Neuman 1977, 1979). The only artifacts recovered from the site included ceramic sherds, stone, and shell. The significance of the site was reported as unknown.

Site 16SMY11, was identified in the southwest portion of the northeast quarter of Section

29, of Township 16S, Range 5E; it was revisited in 1952 by Louisiana State University. The site was situated at the mouth of Hammock Bayou near West Cote Blanche Bay, and it was described as a shell midden with "Tchefuncte and Mississippian" cultural components (State of Louisiana Site Record Form 16SMY11). Artifacts recovered from the site included an unknown quantity of undifferentiated ceramics and shell. The significance of Site 16SMY11 was listed as unknown and recommendations for further work at the site were not contained on the submitted site form (State of Louisiana Site Record Form 16SMY11).

Site 16SMY17 was recorded by McIntire and Warren in 1952; it was identified approximately 1.6 km (1 mi) north of the mouth of Bayou Sale on Cote Blanche Bay, and in the northwest quarter of irregular Section 37, of Township 17S, Range 9E (State of Louisiana Site Record Form 16SMY17). The site was reinvestigated by Brown and Fuller in 1979. Site 16SMY17 was described as a prehistoric period shell midden that contained human remains. Artifacts recovered from the site included an undisclosed number of Baytown Plain ceramic sherds, *Rangia* shell, and fragments of a human cranium and mandible (Neuman 1977; Britsch et al. 1985). From this material, a post-Archaic cultural affiliation was assigned to the site. The National Register significance of the site was listed as unknown and no recommendations for additional testing were contained on the submitted site form (State of Louisiana Site Record Form 16SMY17).

Site 16SMY27 was located on the shore of Atchafalaya Bay and approximately 1.1 km west of Big Wax Bayou; it was recorded by McIntire, Kniffen, Morgan, and Warren in 1952 (State of Louisiana Site Record Form 16SMY27). Site 16SMY27 was identified in the northeast quarter of irregular Section 34, of Township 17S, Range 10E. Materials recovered from the site included a mixture of finely ground clam and oyster shell, and a few heavily wave-washed ceramic sherds; the site was characterized as a possible unspecified post-Archaic period extraction locale (Neuman 1977; Britsch et al. 1985). The National Register significance of this site was reported as unknown and no recommendations for further work were contained on the submitted site form (State of Louisiana Site Record Form 16SMY27).

Site 16SMY31 was recorded by McIntire, Warren, Kniffen, and Morgan in 1952; it was located on Possum Point Bayou at the shore of Wax Lake, in Township 16S, Range 10E. The site was described as a shell midden that measured approximately 183 m (600 ft) in length and 18.3 m (60 ft) in width, and that dated from the Bayou Cutler phase of the Coles Creek period and the Delta Natchezan phase of the Mississippian period. The site was characterized as a "prehistoric hamlet [or] village" that had been damaged partially by erosion (State of Louisiana Site Record Form 16SMY31). The National Register significance of Site 16SMY31 was reported as unknown and no recommendations for further work were recorded on the submitted site form.

Site 16SMY32 was recorded in 1952 by McIntire and Warren; the site was situated on the shore of Atchafalaya Bay and in the southeast portion of the southwest quarter of Section 21, of Township 17S, Range 10E. The site reportedly has been destroyed by erosion; ecofacts recovered from the area consisted of a few wave-washed *Rangia* shells on the marsh beach. The cultural affiliation of the site was listed as unknown. Site 16SMY32 was assessed as not significant and no recommendations for additional testing were contained on the site record form (State of Louisiana Site Record Form 16SMY32).

McIntire recorded Site 16SMY33 in 1952; it was identified approximately 0.4 km (0.25 mi) west of Little Wax Bayou on a natural levee. The site was located in the southwest quarter of the northwest quarter of Section 31, of Township 16S, Range 11E, and it was described as a prehistoric shell midden with an unknown cultural affiliation (State of Louisiana Site Record Form 16SMY33). Although no cultural material was recovered from the site, a limited quantity of shell reportedly was collected. The National Register significance of Site 16SMY33 was listed as unknown (State of Louisiana Site Record Form 16SMY33). No recommendations for further testing were recorded on the submitted site form.

The Ricohoc Site, 16SMY35, was located in the eastern half of Section 6, of Township 15S, Range 11E. The site was situated on the western bank of Bayou Teche and it was recorded by Morgan, McIntire, and Hessland in 1952. Site 16SMY35 reportedly contained the remains of a prehistoric shell midden with an unknown cul-

tural affiliation; the site currently lies in a plowed field. The only material recovered from this partially disturbed site was shell (Neuman 1976, 1977; Britsch et al. 1985). Although the National Register significance of the site was listed as unknown, recommendations for additional testing were included on the submitted site form (State of Louisiana Site Record Form 16SMY35).

Site 16SMY40 is located in the southeast quarter of irregular Section 14, of Township 16S, Range 9E, and it was reported by Brown at an unknown date. Located in the marsh on the bank of Leopard Bayou, cultural material and ecofacts recovered from the site included prehistoric ceramic sherds and shell (Neuman 1977; Britsch et al. 1985). Site 16SMY40 was assessed as not significant and no recommendations for additional work were suggested (State of Louisiana Site Record Form 16SMY40).

Site 16SMY42 was identified on the west bank of Bayou Bartholomew in the northwest portion of the southwest quarter of Section 17 of Township 15S, Range 9E; it was recorded by McIntire and Van Lopik in 1953. The site was characterized as a prehistoric shell midden and possible camp that produced an undisclosed amount of Marksville and Coles Creek period pottery. Although the site was destroyed partially by dredging and impacted further by subsidence, further investigation of the site was recommended (State of Louisiana Site Record Form 16SMY42). The National Register significance of the site, however, was listed as unknown.

First reported by Rivet in 1978, and then revisited by McGimsey in 1995 and Braud in 1997, Site 16SMY66 was identified in the northeast corner of irregular Section 3, of Township 16S, Range 10E. The site was described as an historic (mid-nineteenth to early-twentieth century) plantation quarters complex and associated midden; Site 16SMY66 was located along the banks of Bayou Sale. Investigations at the site produced a variety of historic period artifacts including ceramics, glass, bottles, and assorted metal objects (Rivet 1977). Because of its potential to yield significant information pertaining to the lifeways of early twentieth-century plantation laborers, Site 16SMY66 was assessed as significant and the site was recommended for further investigation (State of Louisiana Site Record Form 16SMY66).

Site 16SMY74 was recorded by Wojtala and Morgan in 1990. It was located approximately 400 m (1,312 ft) east of Bayou Cypremort in Section 41, of Township 14S, Range 8E. Site 16SMY74 was described as a sparse scatter of nineteenth and twentieth century artifacts; this material included an undisclosed amount of whiteware, glass, and brick (Goodwin et al. 1990). The site appeared to be associated with a dwelling located approximately 150 m (492 ft) to the northwest. Site 16SMY74 was assessed as not significant and no additional testing of the site was recommended (State of Louisiana Site Record Form 16SMY74).

Site 16SMY79 was located along the beach of Cote Blanche Bay in Section 23, of Township 15S, Range 7E. Recorded by Marckese in 1993, this multicomponent site produced evidence of Paleo-Indian, Late Archaic, and Baytown components based on the recovery of a Clovis Point, various stemmed projectile points, and ceramics. Site 16SMY79 was considered eligible for inclusion on the National Register of Historic Places (State of Louisiana Site Record Form 16SMY79).

Site 16SMY100 was identified in the southern portion of the northwest quarter of Section 20, of Township 15S, Range 7E; it was recorded by Simmons in 1966 and subsequently revisited by Burden in 1975 and by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16SMY100). The site was situated on a salt dome approximately 150 m (492 ft) east of an unnamed bayou, and it was characterized as a prehistoric period camp site. An undisclosed number of prehistoric ceramic sherds were recovered from the site including types associated with the Marksville, Troyville, Coles Creek, and Plaquemine cultures (Neuman 1977; Brown 1979). The National Register significance of Site 16SMY100 was listed as unknown and no recommendations for further work were provided on the submitted site form (State of Louisiana Site Record Form 16SMY100).

Site 16SMY101 was identified approximately 150 m (492 ft) east of an unnamed bayou in Section 20, of Township 15S, Range 7E. It was recorded by Simmons in 1966 and later revisited by Burden in 1975. The site was described as a prehistoric period shell midden associated with a salt dome located on Cote Blanche Island. Material recovered from the site included shell, a vari-

ety of mammal bones, and approximately 12 prehistoric ceramic sherds. Site 16SMY101 was characterized as a Plaquemine period camp or village. Although the National Register significance of Site 16SMY101 was listed as unknown, it was recommended for additional testing (State of Louisiana Site Record Form 16SMY101).

Site 16SMY102 was located at the northeastern end of the Belle Isle salt dome along the northern edge of a canal that leads to a salt mine. The site was identified in Section 28, of Township 17S, Range 10E by Brown and Fuller in 1979. The site was recorded on the bank of a stream that feeds into Little Doctors Bayou. Artifacts recovered during the investigation of the site included an undisclosed amount of fish and mammal bone, fired-clay objects, and Tchefuncte period ceramics. Site 16SMY102 was assigned a Poverty Point/Tchefuncte cultural affiliation. Although the site was discovered through the process of canal dredging, the intact portions of the midden exhibited two distinct layers of shell, which implied two separate occupations. Neither the potential significance of the sites nor recommendations for additional work were contained in the submitted site form (State of Louisiana Site Record Form 16SMY102).

Site 16SMY103 was recorded by Simmons in 1966. Located in Section 28, of Township 17S, Range 10E, the site was situated on the south side of Belle Isle on Belle Isle Lake. The site was characterized as a prehistoric shell (*Rangia* and *Ostrea*) midden that produced both fish and mammal bones, as well as one incised and five plain ceramic sherds (Neuman 1977, Brown 1979, Britsch et al. 1985). Although the National Register significance of the site was recorded as unknown, Site 16SMY103 was assigned a Mississippian period cultural affiliation (State of Louisiana Site Record Form 16SMY103). No recommendations for further work appear on the submitted site form.

In 1979, Brown and Fuller reported Site 16SMY118 as a multicomponent site that contained both prehistoric and historic/modern material (State of Louisiana Site Record Form 16SMY118). Located in the northwest quarter of irregular Section 37, of Township 17S, Range 9E, the site consisted of dredged shell deposited in three distinct pockets near the mouth of Bayou Sale. A Gary projectile point was found at one locale, and a single sherd of prehistoric Baytown Plain pottery was found at another; based on the recovery of this material, the prehistoric component of the site was assigned a Coles Creek cultural affiliation. National Register significance of Site 16SMY118 was not reported and no recommendations for further work were provided on the submitted site form (State of Louisiana Site Record Form 16SMY118).

Located in the southwest quarter of the southern portion of Section 1, of Township 16S, Range 10E, Site 16SMY132 originally was recorded by Weinstein and Burden in 1975; the site was revisited by Russo in 1993. It was located on the former course of Bayou Sale, a portion of which now forms a part of the Intracoastal Waterway. Both prehistoric and historic cultural material was recovered from the site. In addition, a shell lens that produced one Tchefuncte-like sherd and an undisclosed amount of faunal material was identified. The Tchefuncte cultural component was characterized as the remains of a possible camp. Historic artifacts recovered from the site included an undisclosed amount of brick, glass, nails, and bolts probably associated with the nineteenth century North Bend Plantation and the standing brick ruins of a twentieth century sugar mill. Although the National Register significance of the site was not assessed, it appeared that the site soon would be destroyed by levee building; consequently, additional testing at the site was recommended (State of Louisiana Site Record Form 16SMY132).

Site 16SMY134 was recorded by Weinstein and Burden in 1975 and it was revisited by Shuman in 1995. Located approximately 30 m (1,000 ft) east of Bayou Cypremort in Township 14S, Range 6E, Site 16SMY134 originally was reported as an undistinguishable prehistoric period shell accumulation that produced a single bone, probably deer. Investigations by Shuman in 1995 yielded only modern cultural debris, a portion of a concrete culvert, and no evidence of a prehistoric component. The original report in 1975, by Weinstein and Burden, suggested further investigation, yet the 1995 update noted that the site had been destroyed; no artifacts were observed during the subsequent investigation and no further work at the site was recommended. Neither the 1975 or

1995 site forms provided a National Register assessment of the site (State of Louisiana Site Form 16SMY134).

Site 16SMY150 was identified on a point between Cypremort Point and Dead Cypress Point and approximately 0.3 km (0.18 mi) from the mouth of Hammock Bayou. Located in the southeast portion of the northwest quarter of Section 29, of Township 15S, Range 6E, Site 16SMY150 was recorded by McIntire in 1952, and described as a prehistoric shell extraction locale (Brown 1979). The recovery of an unspecified number of ceramic sherds suggested a Tchefuncte and Coles Creek cultural affiliation. The National Register significance of the site was listed as unknown and no recommendations for further work were contained in the submitted site form (State of Louisiana Site Record Form 16SMY150).

Recorded by Brown and Fuller in 1979, Site 16SMY151 was characterized as redeposited shell (*Rangia* and *Ostrea*) that produced both prehistoric ceramics and a single chert biface. The site was situated on the bank of Bayou Cypremort and it was located in the southeast portion of the northeast quarter of Section 20, of Township 15S, Range 6E. Although an undisclosed number of prehistoric ceramic sherds were recovered from the site, no cultural affiliation was reported. Site 16SMY115 was not assessed and no additional testing of the site was recommended (State of Louisiana Site Record Form 16SMY151).

Site 16SMY152 was recorded in the southwest portion of the southeast quarter of Section 7, of Township 15S, Range 9E; it was identified on the southern shore of Mud Lake and on what once was the course of a small bayou. The site, although reportedly dredged and probably destroyed, represented the remnants of a prehistoric period shell deposit that contained an undisclosed number of Baytown Plain and Pontchartrain Check Stamped ceramic sherds. The site was recorded by Brown and Fuller in 1979 and it was assigned a Coles Creek cultural affiliation. No National Register significance assessment or recommendations for additional work were provided on the submitted site form (State of Louisiana Site Record Form 16SMY152).

Brown and Fuller also recorded Site 16SMY153 in 1979. This prehistoric site had been dredged and probably destroyed. The site, located on the eastern end of the canal which joins Bayou Long and Bayou Carlin, was identified in Township 16S, Range 8E (State of Louisiana Site Record Form 16SMY153). Although the site displayed large amounts of shell (*Rangia* and *Ostrea*), very little pottery was recovered during the investigation (Britsch et al. 1985). Only one Pontchartrain Check Stamped ceramic sherd was recovered; it suggested a possible Coles Creek cultural affiliation for the site. Site 16SMY153 was not assessed and no recommendations for additional work were reported (State of Louisiana Site Record Form 16SMY153).

Site 16SMY154 was recorded by Brown and Fuller in 1979. Situated on the north shore of East Cote Blanche Bay along the right (west) bank of Jackson Bayou in Township 16S, Range 8E, the site reportedly was destroyed by wave action. Site 16SMY154 contained a thick deposit of beach-washed *Rangia* shell from which an undisclosed number of prehistoric ceramic sherds were recovered. Although the ceramics recovered were not identified, Brown and Fuller dated Site 16SMY154 from the Tchefuncte, Marksville, and Coles Creek periods. No statement regarding site significance and no suggestions for further work were reported (State of Louisiana Site Record Form 16SMY154).

Located in the southwest portion of the northwest quarter of irregular Section 9, of Township 17S, Range 9E, Site 16SMY155 was situated approximately 0.6 km (0.37 mi) south of the mouth of Shrimp Bayou on East Cote Blanche Bay. The site, recorded by Brown and Fuller in 1979, contained a heavy concentration of redeposited shell that contained both recent and historic period material as well as "a few sherds of Baytown Plain" ceramics (State of Louisiana Site Record Form 16SMY155). The prehistoric component of the site was assigned a Tchefuncte cultural affiliation. The significance of the site was not assessed and no recommendations for additional testing were reported (State of Louisiana Site Record Form 16SMY155).

Site 16SMY156, recorded in 1979 by Brown and Fuller, was identified on the beach south of Old Cote Blanche Landing, on the south shore of Cote Blanche Island. Located in the southeast portion of the southwest quarter of irregular Section 22, of Township 15S, Range 7E, Site

16SMY156 was inundated by high tides at the time of survey. Although previous collections reportedly were recovered from the site during low tides, no cultural material was recovered by Brown and Fuller. Site 16SMY156 was described as destroyed, and no National Register significance statement was contained on the submitted site form (State of Louisiana Site Record Form 16SMY156).

Site 16SMY157 was located along the banks of Bayou Sale in the northeast quarter of irregular Section 16, of Township 16S, Range 9E by Fuller in 1979. The site produced an undisclosed amount of small prehistoric sherds (Baytown Plain, Coles Creek, Pontchartrain Check Stamped, and one possible Marksville Incised) as well as a few chipped chert pebbles. The presence of these ceramic artifacts suggested a Coles Creek or possibly Late Archaic or Poverty Point period cultural affiliation (State of Louisiana Site Record Form 16SMY157). Site 16SMY157 was described as "heavily disturbed by cultivation" and the site was not assessed and no further work at the site was recommended. The site form noted that Site 16SMY157 may once have been a part of Site 16SMY158 which was located 150 m (492 ft) to the north (State of Louisiana Site Record Form 16SMY157).

Site 16SMY158, also known as the South Bend Site, was recorded along the bank of Bayou Sale in the southeast quarter of irregular Section 15, of Township 16S, Range 9E. Although the site was described by Fuller as "heavily cultivated and possibly destroyed," an undisclosed number of prehistoric ceramic sherds were recovered. These included one Baytown Plain sherd, one possible Pontchartrain Check Stamped sherd, "a scatter of small sherds, a few chert flakes, chipped pebbles, and a bifacially flaked chert scraper" (State of Louisiana Site Record Form 16SMY158). No cultural affiliation was assigned to the site and no National Register assessment or recommendations for additional testing were recorded on the submitted site form.

Site 16SMY159 was recorded in 1979 by Fuller and it subsequently was revisited by McGimsey in 1995. The site was identified along the bank of Bayou Sale and it was located in Lot 1 of Township 16S, Range 9E. Fuller characterized the site as a "scatter of chipped chert pebbles and possible debitage," suggesting the possible existence of a lithic workshop of unknown cultural affiliation. McGimsey was unable to relocate the site in 1995; he noted, however, that Site 16SMY159 no longer had research potential (State of Louisiana Site Record Form 16SMY159).

Located in Section 28 of Township 17, Range 10E, Site 16SMY160 was recorded by Brown and Fuller in 1979 (Weinstein et al 1984). This multicomponent site, situated on the bank of Poverty Bayou, included an undisclosed number of Baytown Plain prehistoric ceramic sherds, as well as some early nineteenth century artifacts that appeared to be "materials washing off [a nearby] hill" located above the site. The lower portion of the site was reported as "destroyed by ditch digging," but the higher portion of the site was recorded as possibly still intact (State of Louisiana Site Record Form 16SMY159). The site was not assessed and no recommendations for additional work were reported.

Site 16SMY161, also known as the Lookout Hill Site because it represented a possible residence of Jean Lafitte, was recorded by Brown and Fuller in 1979. Situated on top of Lookout Hill, between Poverty Bayou and Belle Isle Lake, the site was identified in Section 28 of Township 17S, Range 10E. Site 16SMY161 contained two components including a "scatter of early 19th century early historic material" and a single prehistoric Baytown Plain ceramic sherd. Brown and Fuller (State of Louisiana Site Record Form 16SMY161) reported that although the masonry ruins, previously located on the hill, had been destroyed by the construction of modern oil storage tanks, a portion of the site may still be extant. No National Register assessment of the site or recommendations for further testing were recorded on the submitted site form (State of Louisiana Site Record Form 16SMY161).

Site 16SMY162 was recorded by Brown and Fuller in 1979 in Section 28, of Township 17S, Range 10E. The site was identified on the southeast flank of Bald Hill on the Belle Isle salt dome and approximately 350 m (1148 ft) south of Little Doctors Bayou. An undisclosed number of prehistoric lithic artifacts and several Baytown Plain ceramic sherds were recovered as well as "some recent material" (State of Louisiana Site Record

Form 16SMY162). The site was not assessed and no recommendations for additional work were reported.

Site 16SMY167 was recorded by Weinstein in 1984; it was located in the eastern half of Section 28, of Township 17S, Range 10E. Situated on both the north and south sides of an unnamed canal leading west from the modern salt works located on Belle Isle, this historic site "consist[ed] of [a] brick building and brick bulkheads on [the] west side of Cargill Canal" and it contained a possible saw mill (State of Louisiana Site Record Form 16SMY167; Weinstein 1984). The research potential for the site was assessed as "good, especially . . . in and around [the] probable saw mill" area. The site was assessed as potentially eligible for inclusion on the National Register of Historic Places and additional testing of the site was recommended (State of Louisiana Site Record Form 16SMY167).

Weinstein also recorded Site 16SMY168, the Brashear Cemetery, in 1984. The cemetery was located near Poverty Bayou in Section 28, of Township 17S, Range 10E. Although no burial headstones were examined, the cemetery apparently dated from the nineteenth century. The site was assessed as not eligible for inclusion on the National Register of Historic Places; however, further research was recommended to determine the history of the cemetery (State of Louisiana Site Record Form 16SMY168).

Located in the southern half of the southeast quarter of the southern half of Section 47, of Township 14S, Range 9E, Site 16SMY172 was recorded by Goodwin and Associates, Inc., in 1985. This multicomponent site was identified on the north bank of Bayou Teche, about 3.2 km (2 mi) east of Baldwin, Louisiana. Site 16SMY172 was characterized as a surface scatter and subsurface collection of prehistoric ceramic sherds, historic ceramic artifacts, glass, and metal (State of Louisiana Site Record Form 16SMY172; Yakubik et al. 1985). The prehistoric component of the site was assigned a Coles Creek cultural affiliation; however, no date was recorded for the historic period component. Although the site was assessed as not significant, further testing of the site was recommended (State of Louisiana Site Record Form 16SMY172).

Goodwin and Associates, Inc., also recorded Site 16SMY173 in 1985 (Yakubik 1985). This site was located in the eastern half of irregular Section 5, of Township 13S, Range 9E. The site was situated atop a levee along Bayou Teche and it represented a late nineteenth century historic period ceramic and glass scatter. Impacted by plowing and erosion, Site 16SMY173 was assessed as not eligible for inclusion on the National Register; no additional investigation of the site was recommended (State of Louisiana Site Record Form 16SMY173).

Site 16SMY177, the Adeline Store, was recorded by R. Christopher Goodwin and Galloway Shelby in 1985. The site, situated approximately 100 m (328 ft) south of Bayou Teche, was located in the northeast portion of the northwest quarter of the northwest quarter of Section 35, of Township 13S, Range 9E. The site contained an unspecified amount of late nineteenth to mid-twentieth century ceramics, glass, and metal preserved in a pocket of burned debris (State of Louisiana Site Record Form 16SMY177, Yakubik et al. 1985). The site was assessed as not eligible for inclusion on the National Register (State of Louisiana Site Record Form 16SMY177).

Vermilion Parish

Site 16VM1 was recorded in 1952 by Saucier and Van Lopik (State of Louisiana Site Record Form 16VM1). Situated at the mouth of the New Vermilion Bayou Canal and Vermilion Bay, the site was located in the southwest quarter of the northeast quarter of Section 14, of Township 15S, Range 3E. Although no evidence of an *in-situ* cultural midden was recovered, Site 16VM1 was described as a prehistoric accumulation of shell (*Rangia* and *Osteria*). Based on the recovery of worn and redeposited Baytown Plain ceramics, the site was assigned a post-Archaic period cultural affiliation. The site was described as destroyed; no further testing of the site was recommended (State of Louisiana Site Record Form 16VM1).

Site 16VM2 was located in irregular Section 40, of Township 15S, Range 3E, on Sheh Island in Vermilion Bay just south of the mouth of Vermilion Bayou. Recorded by Louisiana State University in 1952, the site was characterized as a probable post-Archaic prehistoric shell midden that contained an unspecified amount of unidentified ceramics and projectile points (State of Louisiana Site Record Form 16VM2). The site

largely was destroyed by dredging and it was expected to be destroyed completely by ongoing modern activities. No recommendations for future work were recorded on the submitted site form (State of Louisiana Site Record Form 16VM2).

Site 16VM3 was located in Section 26, of Township 16S, Range 5E by McIntire and Van Lopik in 1953; it was revisited by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16VM3). The site was characterized as a redeposited shell midden situated along the bank of the Bayou Chen Canal, and it produced an unknown quantity of prehistoric period ceramics. These included Pontchartrain Check Stamped, Coles Creek Incised, and Baytown Plain ceramics. The investigators characterized Site 16VM3 as a possible campsite that dated from the Tchefuncte, Coles Creek, and Plaquemine periods. No recommendations for further work were contained on the submitted site form.

Site 16VM5 was recorded by McIntire in 1951; it was located in irregular Section 38, of Township 15S, Range 3E. Described as a "prehistoric scatter" of "shells and sherds", the site was identified at the entrance of Vermilion Bayou and Vermilion Bay and it was assigned a post-Archaic period cultural affiliation (Gagliano et al. 1975). No recommendations for further work were discussed on the submitted site form (State of Louisiana Site Record Form 16VM5).

Site 16VM11 was recorded in 1951 by McIntire, Morgan, and Russell, and subsequently it was revisited between 1964 and 1979 by Neuman and Simmons, Floyd, and Brown and Fuller (State of Louisiana Site Record Form 16VM11). The site, characterized as a shell midden, was situated on the east bank of Belle Island Bayou in the southwest quarter of irregular Section 3, of Township 16S, Range 2E. An unspecified quantity of unidentified ceramic sherds was recovered as a result of these investigations. The site was assessed a Coles Creek cultural affiliation and it was characterized as a campsite. No recommendations for additional testing were included on the site form.

Site 16VM12 was recorded by McIntire, Morgan, and Russell in 1951, and it later was revisited on various occasions between 1968 and 1979 by Neuman and Simmons, Floyd, and Brown and Fuller (State of Louisiana Site Record Form 16VM12). The site was situated along the bank of Belle Isle Bayou, and it was identified in the southwest quarter of irregular Section 3, of Township 16S, Range 2E. The site was described as a "prehistoric scatter"; a number of Coles Creek and Plaquemine period ceramic sherds were recovered from the site. Site 16VM12 was characterized as a camp, and assigned a Tchefuncte, Marksville, and transitional Coles Creek/ Plaquemine cultural affiliation. Late Plaquemine and Mississippian components also were identified at the site. Oyster shell recovered from the site appeared to be the remains of a reef and it served as the foundation for the later aboriginal occupation and not as a food resource. No recommendations for additional testing of the site were included on the submitted site form (State of Louisiana Site Record Form 16VM12).

Site 16VM15 was recorded in 1951 by McIntire; it was located in irregular Section 12, of Township 17S, Range 2E, on the bank of an unnamed waterway. This site was described as a prehistoric post-Archaic period campsite and it produced an unspecified number of unidentified ceramic sherds (Brown 1979; Gibson 1976). Because the location of Site 16VM15 does not agree with the geographic coordinates given, the site also was assigned the site number 16VM127. No recommendations for additional investigations were contained on the site form (State of Louisiana Site Record Form 16VM15).

Site 16VM16 was located on the west bank of the Vermilion River in the northeast quarter of irregular Section 87, of Township 14S, Range 3E. The site was recorded by McIntire and Saucier in 1952 and it was described as a shell midden and prehistoric camp, or possibly a hamlet or village dating from the Coles Creek and Plaquemine periods. A total of 174 prehistoric ceramic sherds were recovered from the site. These included examples of Rhinehart Punctate, Pontchartrain Check Stamped, Chevalier Stamped, Harrison Bayou Incised, Hardy Incised, and Plaquemine Brushed. No further testing of the site was recommended (State of Louisiana Site Record Form 16VM16).

Site 16VM17 was recorded by McIntire and Saucier in 1952 and it was revisited by Burden in 1975. The site was located in the northeast half of irregular Section 35, of Township 14S, Range 3E. It was described as a shell ridge and it was located about 210 m (690 ft) northwest of Onion

Lake. Site 16VM17 contained a black organic humus layer mixed with the shell that produced an unspecified number of ceramic sherds. This material included shell, a few Baytown Plain ceramic sherds, and a piece of ground sandstone. The site was characterized as a prehistoric camp and assigned a Coles Creek cultural affiliation. No recommendations for additional study of the site were reported (State of Louisiana Site Record Form 16VM17).

Site 16VM18 was identified on a portion of land surrounded on three sides by Green Island Bayou. It was recorded by McIntire and Saucier in 1952 and was revisited by Brown and Fuller in 1979. The site fell within the northwest quarter of the northeast quarter of Section 1, of Township 14S, Range 3E. It contained evidence of four separate shell deposits, each arranged around a lagoon. Artifacts recovered from the site included several Pontchartrain and Baytown Plain ceramic sherds. The site was assigned a Coles Creek cultural affiliation and characterized by the investigators as a camp and/or extraction locale. No recommendations for future investigations of the site were contained on the submitted site form (State of Louisiana Site Record Form 16VM18).

Site 16VM19 was recorded by McIntire and Saucier in 1952, and later revisited by Brown and Fuller in 1979 and again in 1993 by Exnicios (State of Louisiana Site Record Form 16VM19). Situated on the west bank of Onion Bayou and adjacent to the Vermilion River cut off, the site was located in the northwest quarter of Section 19, of Township 15S, Range 3E. The site contained the remains of one small and one medium sized shell mound, both arranged around a small lagoon. An unspecified number of prehistoric ceramic sherds were recovered from the site and these included one Pontchartrain ceramic sherd and a few Baytown Plain examples. The site was characterized as a Coles Creek period extraction locale and camp. Due to the poor condition of the site, Exnicios assessed the site as not eligible for inclusion on the National Register of Historic Places. No further investigation of the site was recommended (State of Louisiana Site Record Form 16VM19).

Site 16VM20 initially was recorded by McIntire and Saucier in 1952 and it later was revisited by Brown and Fuller in 1979. Located in the southeast quarter of the southeast quarter of Section 27, of Township 14S, Range 4E, Site 16VM20 was identified along the western shore of Lake L'Isle a Pete. The site contained a deposit of shell (*Rangia*) which overlaid a highly organic black peat. At least one unnamed prehistoric ceramic sherd was recovered from the site as a result of these investigations. The site was assigned an unknown post-Archaic period cultural affiliation. It reportedly may represent the remains of a former campsite or resource extraction locale. No recommendations for additional study of the site were contained on the submitted site form (State of Louisiana Site Record Form 16VM20).

Site 16VM21 was located in the central portion of the southeast quarter of Section 34 of Township 15S, Range 3E. The site was recorded in 1952 by Saucier and Van Lopik. It was identified in the marsh about 305 m (1,000 ft) north of North Lake, and it was characterized as a shell ridge. Although no artifacts were recovered during the investigation, the site contained a number of characteristics that suggested a prehistoric cultural affiliation. No recommendations for future work were contained on the submitted site form (State of Louisiana Site Record Form 16VM21).

Site 16VM22 was located on a small peninsula along the western shore of North Lake in the southeast quarter of the northwest quarter of Section 3, of Township 16S, Range 3E. The site was recorded in 1952 by McIntire et al., who characterized it as a prehistoric shell midden. The site produced an unspecified amount of Baytown Plain and Mazique Incised ceramic sherds, and it was assigned a transitional Coles Creek, Plaquemine, and possibly late Plaquemine cultural affiliation (Brown 1979). No recommendations for additional examination of the site were contained on the submitted site form (State of Louisiana Site Record Form 16VM22).

Site 16VM23 was recorded by Saucier and Van Lopik in 1952 and subsequently revisited by Simmons in 1964 and by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16VM23). The site was identified along the north bank of Bayou Fearman near Vermilion Bay, and it was located in the southwest portion of the southeast quarter of Section 3, of Township 16S, Range 3E. The site was described as a prehistoric post-Archaic period beach deposit, possibly representing two shell middens. The site produced an

unspecified number of Baytown Plain ceramic sherds. No recommendations for further investigation of the site were contained on the submitted site form (State of Louisiana Site Record Form 16VM23).

Saucier and Van Lopik also recorded Site 16VM24 in 1952 and it, too, was revisited by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16VM24). The site was characterized as a prehistoric shell midden and it fronted along the shore of Vermilion Bay. Site 16VM24 was located in the northwest portion of the southeast quarter of Section 29, of Township 16S, Range 4E. An unspecified amount of cultural material was recovered as a result of this investigation including human bone, two Desmuke projectile points, a Gary projectile point, and a variety of ceramic types, including examples of Marksville Stamped, Evansville Punctated, and Coles Creek Incised. The site was assigned a Tchefuncte, Marksville, late Plaquemine, and transitional Coles Creek/Plaquemine cultural affiliation. No recommendations for additional study were contained on the examined site form (State of Louisiana Site Record Form 16VM24).

Recorded in 1952 by Van Lopik, Site 16VM25 later was revisited by Brown and Fuller in 1979. This site originally was reported as a shell midden located in the central portion of the southwest quarter of Section 13, of Township 16S, Range 2E. When Brown and Fuller revisited the site in 1979, however, they concluded that it was not an archeological site, but was the result of dredging activities along the Belle Isle beach ridge. No artifacts were recovered as a result of either of these surveys. No recommendations for additional study were contained on the submitted site form (State of Louisiana Site Record Form 16VM25).

Site 16VM26 was recorded by McIntire and Saucier in 1952 and it later was revisited by Weinstein and Burden in 1975 and by Brown and Fuller in 1979. Located in Township 14S, Range 5E, and situated at the junction of old Bayou Hebert and Oaks Canal, the site was characterized as a shell midden. An unknown number of ecofacts and artifacts were recovered from the site and these included alligator scales, and animal bone as well as various types of prehistoric ceramic sherds. The presence of Evansville Punctate, Plaquemine Brushed, Pontchartrain Check Stamped, Mazique Incised, and Coles Creek Incised ceramics resulted in the identification of Tchefuncte, Troyville, Coles Creek, and Plaquemine cultural components at the site. The National Register significance of Site 16VM26 was listed as unknown and no recommendations for further testing were recorded on the submitted site form (State of Louisiana Site Record Form 16VM26).

Located in Section 6, of Township 17S, Range 4E, Site 16VM28 was recorded by McIntire, Morgan, and Warren in 1952. The site was identified along the bank of an unnamed bayou near Deadman Island. Site 16VM28 was characterized as a prehistoric shell midden. No artifacts were recovered as a result of this investigation and no cultural affiliation was assigned. No recommendations for additional examination of the site appear on the submitted site form.

Site 16VM29 was located in the southeast portion of the southeast quarter of Section 5 of Township 17S, Range 3E. Recorded by McIntire, Saucier, and Van Lopik in 1952, the site was revisited by Brown and Fuller in 1979. The site was classified as a prehistoric shell midden and it was located within the marsh, about 0.4 km (0.25 mi) north of the Gulf shore and about 1.6 km (1.0 mi) from Southwest Pass. Although the site was assigned a "prehistoric" cultural affiliation and function, no artifacts were recovered as a result of these investigations. The significance of the site was listed as unknown and no recommendations for future work were recorded on the submitted site form (State of Louisiana Site Record Form 16VM29).

Site 16VM32 was identified by McIntire and Van Lopik in 1953. It was described as a "shell midden" located in Township 16S, Range 2E. Site 16VM32 later was revisited by Brown and Fuller in 1979, however, and they reported that the site probably represented a natural feature. No artifacts were recovered from the site area. The National Register significance of Site 16VM32 was listed as unknown and no recommendations for further work were contained on the submitted site form (State of Louisiana Site Record Form 16VM32).

Site 16VM33 was located near the junction of the Vermilion River and Intracoastal City in the southwest quarter of irregular Section 90, of Township 14S, Range 3E. The site was recorded

by McIntire and Van Lopik in 1953 and later revisited by Philips in 1970, Weinstein and Burden in 1975, and Brown and Fuller in 1979 (State of Louisiana Site Record Form 16VM33). At least 264 artifacts were recovered as a result of these investigations. This material included examples of Pontchartrain Check Stamped, Rhinehart Punctated, Plaquemine Brushed, Coles Creek Incised, Dupre Incised, and Manchac Incised, as well as a large number of unidentified ceramic types (State of Louisiana Site Record Form 16VM33). The site was described as a prehistoric shell midden and possible camp and it contained evidence of both a Coles Creek and Plaquemine period cultural affiliation (Gagliano et al. 1975; Brown 1979). Although the National Register significance of this site was recorded as unknown, additional investigation of the site was recommended (State of Louisiana Site Record Form 16VM33).

Located in the northwest portion of irregular Section 89, of Township 14S, Range 3E, Site 16VM35 was recorded by Weinstein and Burden in 1975 and revisited by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16VM35). The site was identified along the east bank of the Vermilion River at its junction with the north bank of the Intracoastal Canal. The site contained a sparsely scattered deposit of shell; only one prehistoric Baytown Plain ceramic sherd was recovered as a result of these investigations. Site 16VM35 was characterized as a post-Archaic period campsite. While the National Register significance of the site was listed as unknown, additional investigation of the site was recommended (State of Louisiana Site Record Form 16VM35).

Site 16VM36 initially was recorded by Weinstein and Burden in 1975 and later revisited by Brown and Fuller in 1979. The site was located in the northeast quarter of irregular Section 90, of Township 14S, Range 3E, and along the northwest corner of the junction of the Intracoastal Waterway and the Vermilion River. The site was described as a prehistoric shell midden and possible campsite (Gagliano 1976; Brown 1979). An unspecified amount of cultural material was recovered from the site, and this included several Baytown Plain ceramic sherds and a complete Gary projectile point. The site subsequently was assigned a Marksville period cultural affiliation. While the National Register significance of the site was listed as unknown, further investigation of the site nonetheless was recommended (State of Louisiana Site Record Form 16VM36).

Site 16VM100 was recorded by Simmons in 1966; it was located on the south bank of Belle Isle Bayou in the Rainey Wildlife Sanctuary, and in Section 1, of Township 16S, Range 2E. The site was described as a prehistoric campsite and shell midden that produced an unspecified number of ceramic sherds. The site was assigned a Troyville, Coles Creek, and Plaquemine period cultural affiliation (Frank 1982). The National Register status for the site was listed as unknown and no recommendations for additional testing were suggested on the submitted site form (State of Louisiana Site Record Form 16VM100).

Located in the southwest quarter of the northwest quarter of Section 28, of Township 16S, Range 4E, Site 16VM103 was classified as a prehistoric period shell midden of unknown cultural affiliation. Situated along the south shore of Vermilion Bay, the site was recorded by Weinstein in 1976. Oyster and *Rangia* shell were the only material recovered from this site. The National Register significance of the site was listed as unknown and no recommendations for future investigations were contained on the site form (State of Louisiana Site Record Form 16VM103).

Site 16VM105 was recorded by Brown and Fuller in 1979 and later revisited by Russo in 1993. The site was identified in the northeast quarter of the northeast quarter of Section 34, of Township 14S, Range 4E, and along the shore of an unnamed lake situated just west of Lake L'isle a Pete. Characterized as a prehistoric, mounded shell midden and possible camp, an unspecified number of ceramic sherds were recovered from the site (Brown 1979). This material included a number of Mazique Incised, Pontchartrain Check Stamped, Coles Creek Incised, and Baytown Plain ceramic sherds. The site subsequently was assigned a Coles Creek period cultural affiliation. Although the National Register significance of the site was listed as unknown, further examination of the site was recommended (State of Louisiana Site Record Form 16VM105).

Site 16VM106, also recorded by Brown and Fuller in 1979, was revisited by Russo in 1993. The site, situated on Cock Island, was located in the northwest portion of the northeast quarter of

Section 26, of Township 14S, Range 4E. It was described as a prehistoric period mounded shell midden and possible campsite. The site produced a variety of ceramic sherds and these included a number of examples of Baytown Plain. The site was assigned a probable Coles Creek phase cultural affiliation and no further investigation of the site was recommended. The National Register significance of the site was listed as unknown (State of Louisiana Site Record Form 16VM106).

Site 16VM107, recorded by Brown and Fuller in 1979, was identified in the northwest quarter of the southwest quarter of Section 2, of Township 15S, Range 3E, and along the west side of Onion Bayou. The site was classified as the remains of a prehistoric shell mound and possible campsite. An unspecified amount of cultural material was recovered during the investigation including a variety of Pontchartrain and Baytown Plain ceramic sherds; these artifacts suggested that Site 16VM107 dated from the Coles Creek period. The National Register status of the site was recorded as unknown and no recommendations for future work were contained on the submitted site form (State of Louisiana Site Record Form 16VM107).

Located in the southwest portion of the southwest quarter of Section 11, of Township 14S, Range 3E, Site 16VM108 was recorded by Brown and Fuller in 1979 (State of Louisiana Site Record Form 16VM108). The site was situated on the west side of the Vermilion River cutoff almost opposite the mouth of Onion Bayou. Characterized as a prehistoric post-Archaic period shell midden and possible campsite, only one Baytown Plain ceramic sherd was recovered as a result of this investigation. The National Register significance of the site was recorded as unknown and no recommendations for future work were contained on the submitted site form (State of Louisiana Site Record Form 16VM108).

Site 16VM114 was recorded by Brown in 1978. Located in the southwest quarter of irregular Section 2, of Township 16S, Range 2E, this site was described as a Coles Creek and possibly transitional Coles Creek/Plaquemine period shell midden. This recommendation was based on the recovery of an unspecified amount of unidentified prehistoric ceramic sherds. The National Register significance of the site was listed as unknown and no recommendations for further work were suggested on the submitted site form (State of Louisiana Site Record Form 16VM114).

Site 16VM115 was identified at the southern juncture of Belle Isle Bayou and Belle Isle Lake and in the northeast quarter of irregular Section 1, of Township 16S, Range 2E. The site was recorded by Simmons in 1966; it was revisited by Brown and Fuller in 1979. It was characterized as a prehistoric shell midden and possible campsite with a "heavy concentration of Marksville, Coles Creek and Plaquemine" ceramic sherds (State of Louisiana Site Record Form 16VM115). Based on the recovery of this material, the site was assigned a Marksville, Coles Creek, transitional Coles Creek/Plaquemine, and possibly a Troyville cultural affiliation (Brown 1979; Frank 1982). The National Register significance of the site was listed as unknown, and no recommendations for future evaluations of the site appeared on the site form (State of Louisiana Site Record Form 16VM115).

Site 16VM116 was recorded by Brown and Fuller in 1979 and it was situated approximately 50 m (164 ft) north of an unnamed drainage in the northeast portion of the southwest quarter of Section 12, of Township 16S, Range 2E,. Site 16VM116 was characterized as a prehistoric Coles Creek period campsite; this interpretation was based on the recovery of an unspecified number of Baytown Plain and Coles Creek Incised ceramic sherds. The National Register significance of the site was recorded as unknown and no recommendations for future investigation were included on the submitted site form (State of Louisiana Site Record Form 16VM116).

Brown and Fuller also recorded Site 16VM117 in 1979. Located in the northeast quarter of irregular Section 36, Township 16S, Range 3E, the site was situated on the west coast of Vermilion Bay on the peninsula known as Redfish Point. The site was characterized as a prehistoric Coles Creek scatter and possible campsite; this interpretation was based on the recovery of Pontchartrain Check Stamped ceramics and a complete Gary projectile point. The site also was reported to contain an historic component, as indicated by the presence of some olive green bottle glass fragments. Site 16VM117 was not assessed and no recommendations for additional work were contained on the site form (State of Louisiana Site Record Form 16VM117).

Located in the northeast quarter of Section 6, Township 17S, Range 4E, Site 16VM118 was reported by McIntire et al. in 1952 and revisited by Thomas in 1984. The site was identified approximately 25 m (82 ft) west of an unnamed stream and it was characterized as the remains of a prehistoric Coles Creek period shell midden. Although an unspecified number of Baytown Plain, Mazique Incised and Coles Creek sherds were recovered from the site, no specific statement pertaining to the significance of the site was offered. Additional evaluation of Site 16VM118 was recommended (State of Louisiana Site Record Form 16VM118).

Site 16VM127 was located in the northeast quarter of irregular Section 73, of Township 13S, Range 3E. The site was situated on the west bank of the Vermilion River, and it was recorded by Gibson in 1976. The site was characterized as a mid- to late nineteenth century plantation overseer residence and brick kiln (State of Louisiana Site Record Form 16VM127). Artifacts recovered as a result of this investigation included an unspecified number of historic artifacts. This material included pearlware, yellowware, early whiteware, whiteware, stoneware, glass, brick, iron, machine-cut nails, animal bone, and charred wood. In addition, a partially intact brick kiln and the remains of a residential earth-midden were identified (Gibson 1976). The significance of Site 16VM127 was listed as unknown, and no recommendations for additional testing of the site were contained on the submitted site form (State of Louisiana Site Record Form 16VM127).

Site 16VM146 was recorded by Saunders in 1993 and revisited by Hardy and McGimsey in 1997. This site, also known as Bowie's Island, was located on an irregular area of high land in the marshes situated east of the Vermilion River. Geographically, the site was identified in irregular Section 88, of Township 14S, Range 3E. The site contained evidence of prehistoric, antebellum and postbellum components, but the prehistoric occupation appeared to be limited to the western margin of the island. Materials related to the Civil War era were concentrated in the southwestern corner of the island, and the postbellum material was restricted primarily to the overburden. A total of 120 artifacts were recovered as a result of these investigations, and they included one lithic flake, two Baytown Plain ceramic sherds, various materials dating from the Civil War, wire nails, glass, and other postbellum artifacts. The cultural affiliation of the prehistoric component was listed as unknown, although the recovered artifacts were inferred to be approximately 2,000 years old. Despite recommendations for further investigation of the site, the National Register significance of Site 16VM146 was recorded as unknown (State of Louisiana Site Record Form 16VM146).

Coastal Louisiana Settlement Patterns

While the prehistoric settlement patterns of coastal Louisiana have been studied since the early part of this century, formal models explaining the distribution of sites are relatively new. This discussion focuses on two explanatory models that have been developed to explain settlement patterns in the region that encompasses Marsh Island. Both models were created as a result of Phase I cultural resources surveys and archeological inventories (Altschul 1978; Weinstein and Kelly 1992). The Altschul (1978) model concentrates on settlement patterns along Bayou Lafourche in Terrebonne, Assumption, and Lafourche Parishes. The second model was based on surveys conducted by Weinstein and Kelley (1992) in portions of the Terrebonne marsh area. In addition to these models, a summary of the major findings of the Phase I cultural resources survey of the Golden Ranch Plantation also are presented due in part to the large number of Plaquemine sites identified as a result of that inventory (Pearson et al. 1989).

Altschul Model

In March of 1978, New World Research was contracted by Sverdrup and Parcel and Associates of St. Louis, Missouri, to conduct a Phase I cultural resources survey and archeological inventory throughout portions of Terrebonne, Assumption, and Lafourche Parishes. The project was part of an environmental impact assessment undertaken prior to the construction of a proposed sewage collection and treatment system. The main goal of the project was to relocate and test 31 previously recorded sites that would be impacted by the proposed project. In addition to determining the significance of these sites, the project also was designed to examine the prehistoric settlement patterns of the Mississippi Delta re-

gion (Altschul 1978). The survey area encompassed a series of distributary water courses including: Bayou Black, Bayou du Large, Bayou Grand Caillou, Four Point Bayou, Bayou Petit Caillou, Bayou Terrebonne, and Bayou Pointe Au Chien.

Investigations by New World Research resulted in the identification of 20 prehistoric and 4 historic period sites. Approximately 14 of the 20 newly recorded prehistoric period sites dated from the Plaquemine period (AD 1000 - 1700). Altschul (1978) did not discuss the Marksville and Coles Creek sites identified in the study region in detail because the materials collected from these sites were too "scarce" to interpret properly (Altschul 1978:177). Therefore, only the 14 Plaquemine sites formed the basis of the settlement pattern study. His analysis identified three site types within the region: shell middens located along bayous (n=5); single or multiple mound sites located mainly along natural levees (n=7); and small earth mounds located on natural levees (n=2). Altschul (1978) noted that the last type, earthen mounds, probably were underrepresented in the sample because sites of this type could be destroyed easily by plowing.

Altschul (1978) offered three alternative hypotheses to explain the different types of sites he identified. The first hypothesis centered on the relationship between site type and occupation period. The second hypothesis focused on the contemporaniety (or lack thereof) of the three site types. The third hypothesis was concerned with the association of site type and seasonality of occupation. He noted further that these hypotheses did not exhaust the list of all possibilities, but rather he assessed these scenarios as the most plausible for interpreting the settlement patterns he identified during survey (Altschul 1978).

Through the use of seriation, statistical procedures, and faunal analysis, Altschul (1978) speculated that the Plaquemine sites represented two chronologically distinct culture periods. The sites of the early period included shell middens and small mound complexes (Sites 16TR52, 16TR6, 16TR86, and 16LF33). Based on differences in the faunal collections associated with these sites, Altschul (1978) argued that the shell middens represented spring/summer sites situated along the bayous where aquatic resources were exploited; in contrast, Altschul (1978) suggested that the mound sites were occupied during the fall/winter, when people amassed along the forested natural levees where they hunted.

Sites belonging to the later period (16TR96, 16TR3/19, 16TR37, 16TR38, 16TR7, 16TR33, 16TR5, and 16TR82) were classified primarily as sedentary villages and scattered homesteads that relied on agriculture for subsistence. Altschul (1978) argued that the absence of faunal remains at the second group of sites suggested an increased reliance on agriculture, despite the lack of floral data to substantiate this hypothesis. Additionally, ceremonial centers with large earthen mounds were characteristic of the late period.

Finally, Altschul (1978) argued that the mounds associated with the second group of sites were larger and could have supported more lavish temples, similar to structures described in the ethnographic record. Altschul (1978) noted that the distinction between his early and late period settlement patterns conformed to what commonly was referred to as the Plaquemine and Mississippian cultures respectively. Based on his complementary ceramic seriation, he suggested that the earlier Plaquemine peoples were replaced by more complex Mississippian groups that needed either arable land for agricultural pursuits or access to riverine resources to supplement domesticated plant foods or both.

Weinstein and Kelley Model

In 1986, Coastal Environments, Inc. conducted an archeological survey of the Terrebonne marsh for the U.S. Army Corps of Engineers, New Orleans District (Weinstein and Kelley 1992). The primary research objective of this investigation was to achieve an understanding of the nature of the adaptations made by the aboriginal inhabitants of this region to changes in geomorphic conditions in the marsh. Their study was diachronic, ranging from the Poverty Point period to the modern era; particularly relevant to the current investigation, however, were their hypotheses concerning the settlement patterns of the Coles Creek and Mississippian Periods. The study area examined by Weinstein and Kelley (1992) was located directly west of the area studied by Altschul; the geographic overlap for both studies was Bayou du Large.

Weinstein and Kelley (1992) formulated a series of hypotheses that were tested using the settlement data derived from their archaeological inventory. In general, they concluded that the Coles Creek sites in the region included semi-permanent or permanent villages, some with burial and platform mounds, and small extraction locales. Coles Creek village sites with mounds were located on broad natural levees, while extraction sites occurred mainly on the narrower natural levees of small distributaries. Mississippian settlement patterns were hierarchical with regard to settlement size, architectural complexity, and site structure. Weinstein and Kelly (1992) identified semi-permanent and permanent villages, some with single or multiple platform mounds, small agricultural hamlets, and finally, resource extraction locales. In contrast to sites dating from the Coles Creek period, sites associated with the Mississippian period were more complex, and hamlets as opposed to the larger villages with mounds, were located on the broader natural levees.

Specific site distribution patterns were examined to test further their settlement hypothesis. The clearest example of the Coles Creek period settlement pattern was exhibited by Gibson Mounds (Site 16TR5) and its surrounding suite of sites. Gibson Mounds was classified as a major village with multiple, pyramidal mounds. Weinstein and Kelley (1992) argued that Gibson Mounds was the principal village of the entire Terrebonne marsh region and that this site dominated the natural levee of the Teche-Mississippi channel east of Lake Palourde (Weinstein and Kelley 1992:353). Richeu Field (16TR82) and Pennison Mound (16AS16) were described as single mound sites that probably were subordinate to the Coles Creek inhabitants of Gibson Mounds. In addition, Weinstein and Kelly (1992) speculated that the mounds at Bayou Black (16TR78), Mandalay Plantation (Site 16TR1), and Bayou du Large/Marmande Plantation (16TR19) were within the sphere of influence exercised by the residents of Gibson Mounds.

Seasonally occupied villages were situated in the vicinity of sites such as Gibson Mounds. Examples of non-mound village sites included Goat Island (16SMY1), Waterproof Point Field (16TR215), Waterproof Point Distributary (16TR213), Bayou Ramos I (16SMY133), Greenwood Cemetery (16SMY19), and La Coup (16SMY146). These sites also were positioned on natural levees of old Teche-Mississippi water courses. During winter months, villagers would live near the main mound sites, but during the warm months, villagers would move into the marshes to reside at "base camps" and small-scale resource extraction locales. Sites falling into this final category included primarily shell middens located throughout the marsh and swamp areas. Weinstein and Kelley (1992) noted that many of these sites were quite large in size and they may have been occupied for varying periods of time on multiple occasions. Examples of sites in this category included Turtle Bayou (16TR50), and numerous sites situated along Bayou Ramos. Weinstein and Kelly (1992) noted specifically that while these sites are known as shell middens, the extraction of shellfish may not have been their primary function. These sites almost certainly served as seasonal hunting and fishing camps as well, and the faunal assemblages associated with these camps reflected their diversity of function.

The hypothesized settlement pattern for the Mississippian period was quite similar to that for the preceding Coles Creek period. Weinstein and Kelley (1992:355) note, however, that there was an overall decline in the number of sites present in the Terrebonne marsh during Mississippian times (n=53), and that most (n=33) of theses sites had dated from the early part of the period. All of the "important" sites in the region were tied directly to the local Plaquemine culture.

The primary Mississippian period (Plaquemine culture) village was the Berwick Mounds (16SMY184), a large site composed of four pyramidal mounds arranged around a plaza, a habitation area, and an extraction locale. Weinstein and Kelley (1992) noted that Berwick was undoubtedly the residence of the major tribal leader and that a clear hierarchy of sites developed around this center. The position of Berwick Mounds was ideal for controlling east-west access along the natural levee of the old Teche-Mississippi course as well as north-south traffic along the Lower Atchafalaya. Indeed, Weinstein and Kelley (1992) suggest that Berwick may have been the "center of prehistoric and protohistoric Chitimacha society" (Weinstein and Kelley 1992:356). Evidence for their position was presented in the form of ethnographic accounts of

the early Chitimacha hierarchy and on early accounts of the archeological material recovered from Berwick Mounds. Subordinate to Berwick Mounds was Gibson Mounds along with a series of single mound sites associated with these centers. As had been the case during the Coles Creek period, single mound villages were present at Pennison Mound (16AS16) and Bayou du Large/Marmande Plantation (16TR19). Again following the Coles Creek pattern, the natural levees supported a series of Mississippi period villages without mounds. These villages were, in turn, supported by seasonally occupied aquatic resource extraction sites located on natural levees.

Golden Ranch Plantation Survey

A final study directly relevant to the current investigation was completed by Coastal Environments, Inc. (CEI). Conducted by Pearson et al. (1989), the Golden Ranch Plantation survey produced significant quantities of data regarding the distribution of sites in the area. This work was somewhat different from the studies mentioned above because no settlement model, per se, was developed or tested; rather, the project focus was more descriptive in nature, and the sites were identified, plotted, and discussed.

Some of the more important results of the study were the recordation of a large number of prehistoric sites in the study area. In addition, the authors concluded that "the intensity of prehistoric settlement on the natural levee ridges of Golden Ranch Plantation during the later periods (i.e., post circa AD 1000) reflected a pattern typical for the Barataria Basin region, and, possibly, much of the deltaic plain" (Pearson et al. 1989:191). Pearson et al. (1989) were particularly careful to note that the intensity of settlement was similar to the pattern observed along bayous Barataria and des Familles.

Many Coles Creek period sites were recorded during the CEI survey; most of these sites consisted of small shell middens located on the natural levees of the bayous. One site, the Watersnake Site, was particularly significant because it revealed evidence of numerous human burials, many of which were cremated. The authors noted that the population in the area increased dramatically during the Coles Creek and later periods and that the native populations were taking advantage of the array of food sources available in the area (Pearson et al. 1989:176). The distribution of Coles Creek period sites suggested an emphasis on the collection of shell fish as a major activity. Most sites were located at the juncture of a main channel and a smaller distributary. Because of an absence of large quantities of ceramics in relation to massive numbers of *Rangia* shell, the authors suggested that many of these sites were resource extraction locales that were inhabited only for brief periods of time. These sites were described as collection locales where *Rangia* meat was extracted and then transported to villages in areas farther up the bayou on wider and thus more stable and inhabitable natural levees (Pearson et al. 1989:178).

Mississippian period sites in the Golden Ranch Plantation project area were divided into Bayou Petre and Delta Natchezan phases. Numerous extraction locations were present along Bayou Matherne, especially near its juncture with Bayou Vacherie. In addition, the authors noted that the Temple Site (16LF4), located on the southern edge of Lake Salvador, became an important center during this period. This site was famous for the numerous mounds it once supported; however, erosion and dredging destroyed most of the site. The authors observed that the ceramic sherds collected from sites of the Bayou Petre phase demonstrated a strong influence from the Gulf Coast area and were most similar to the Pensacola Complex wares (Pearson et al. 1989). In addition, they argued that some eastern ceramic types identified during their survey were manufactured on local pastes as opposed to the shell tempered pastes noted to the east and north (Pearson et al. 1989:179). The authors suggest that this trend represented an adaptation to foreign influences of some type. In addition, Pearson et al. (1989) argued that maize agriculture was undertaken along the natural levees, but that fishing, hunting, and shell fish collection remained important sources of food as well. Finally, they observed that "there is currently no reason to accept the concept that the area was only occupied seasonally" (Pearson et al. 1989).

The pattern of occupation demonstrated in the Delta Natchezan phase resembled closely that of the Bayou Petre phase. Ceramic sherds associated with the Delta Natchezan phase included Lower Valley varieties and some types derived from wares more common to the north and east;

several more exotic shapes were identified at Site 16LF3, the Bayou Matherne Site (Pearson et al. 1989).

Discussion of Extant Models

The hypotheses offered by Altschul (1978) and Weinstein and Kelley (1989) differ significantly at face value. In substance, however, their models vary only in the sense that Weinstein and Kelly (1989) do not propose a strong chronological, and, therefore, cultural split between the Mississippian period sites in the region. In this regard, more recent scholarship seems to support the position advanced by Weinstein and Kelley (1989). The results of research in this region indicate that the Mississippian presence was weak when compared to indigenous forces and it probably manifested itself either through special salt procurement expeditions or in the form of trade (Brown et al. 1979). In addition, some writers have noted that the ceramic data cited by Altschul (1978) did not demonstrate the chronological or cultural distinctions between the sites that he suggested (Kidder 1995:57). Weinstein and Kelley (1989) tested, at least partially, their hypotheses concerning site settlement patterns in the region, and their data are consistent with the types of sites recorded in the region. Although Altschul (1978) noted the presence of three site types in the area, (shell middens on bayous, single or multiple mound sites on natural levees, and small earth mounds on natural levees), he failed to account for the possible presence of an important settlement type, that of the village/hamlet. Given the overall suitability of the model advanced by Weinstein and Kelley (1989), their hierarchy of sites is accepted here.

Method and Results of the Present Study

The remainder of this chapter examines settlement correlations present in those areas of Iberia, St. Mary, and Vermilion Parishes situated 8 km (5 mi) from the coastline of East Cote Blanche Bay, West Cote Blanche Bay, and Vermilion Bay, and including Marsh Island, in an effort to determine whether Marsh Island and the near region demonstrates a similar pattern of settlement. In addition, an attempt is made to place Marsh Island within this overall site/settlement pattern. All 91 sites that have been recorded in this area, including those found on Marsh Island (n=6) and along the coast (n=85), are considered in this analysis.

Methods

While the current project focuses exclusively on the possible recovery of material from the northeast portion of Marsh Island, the project area cannot be interpreted in a vacuum. The interpretation of the data presented here provides a broader regional context for the possible existence of site locales and offers suggestions for new potential avenues of future study. In addition to the three reports discussed above, all of the remaining site locational data for coastal Iberia, St. Mary, and Vermilion parishes were gathered from documents obtained from the Louisiana Department of Culture, Recreation, and Tourism, Division of Archaeology site files. The paucity of information contained in the site forms, the limited number of stratigraphic excavations conducted in this area of coastal Louisiana, as well as a lack of consistency in descriptions concerning site type and land forms makes a detailed analysis of the prehistoric settlement patterns of the coastal region difficult. For the purposes of this study, however, a settlement classification consisting of five site types was utilized; these types include: (1) multiple mound sites, (2) single mound sites, (3) prehistoric village sites, (4) shell midden and shell scatter sites and (5) other sites. The criteria of classification for each of the site types is presented below. In addition, information concerning site location, environment, elevation, and soils (Table 13) also are considered.

The rationale for using this site typology is threefold. First, the types can be made mutually exclusive, and can allow for the classification and discussion of all the archeological sites recorded in the three parish coastal area surrounding Marsh Island. Second, the system is general enough to incorporate discussion of each of the site types utilized in the three reports summarized above (Altschul 1978; Pearson et al. 1989; Weinstein and Kelley 1992). Finally, this system makes no attempt to reclassify or impose a new classification system on previously conducted work. The process of classifying each of the sites was based entirely on the information provided on the site forms. Locational information, cultural affiliation, landform association, and the site function classification all were taken directly from site forms

Table 13. Soil Permeability of Previously located Sites.

SOMEWHAT EXCESSIVELY DRAINED SOILS
Cheniere Series
WELL DRAINED SOILS
Memphis Series
MODERATELY WELL DRAINED SOILS
Cypremort Series Lintonia Series Richland Series
MODERATELY DRAINED SOILS
Buxin Series
IMPERFECTLY DRAINED SOILS
Portland Series
SOMEWHAT POORLY DRAINED SOILS
Coteau Series Crowley Series Patoutville Series
POORLY DRAINED SOILS
Baldwin Series Frost Series Iberia Series Mermentau Series Perry Series
VERY POORLY DRAINED SOILS
Allemands Series Bancker Series Cloverly Series Delcomb Series Lafitte Series Placedo Series Scatlake Series

with only minor adjustments concerning the landform classification. Only three principal landform features were distinguished on the site forms; natural levees adjacent to bayous, marshes, and beaches. The distributions of each site type on the various landforms also is presented below.

Multiple Mound Sites

Only one site within the area contained multiple mounds. Site 16IB3 contained two mounds, both of which were situated on a salt dome. Although the known shapes for mounds may vary from low platform, pyramidal (truncated), to conical, the two mounds at Site 16IB3 are described as "alligator shaped" (State of Louisiana Site Record Form 16IB3). The site was described as containing Tchefuncte, Marksville, Troyville, Coles Creek, and Plaquemine components. Possible evidence of an Archaic period cultural deposit also was identified. Information concerning repeated occupations of these cultural groups was not obtained during De Le Blanc's 1940 survey (State of Louisiana Site Record Form 16IB3).

Due to the limited nature of Phase I cultural resources survey, no detailed documentation of the site was undertaken. No evidence of features (i.e., plazas, structures, or burials) was identified as a result of these investigations. This site was associated with a shell midden, yet the site is situated on the bank of Weeks Bayou and it lies approximately 2 km (1.24 mi) from the nearest known shell bed. The elevation of the site was recorded as <1.5 m (<5 ft) above mean sea level (amsl). Soils at the site consisted of well drained Memphis silt loam (Figure 20 [located in the back pocket of this report]).

Single Mound Sites

A total of seven sites (16IB145, 16SMY3, 16SMY6, 16SMY7, 16VM20, 16VM106, and 16VM107) characterized by a single mound have been recorded in the study area. The distinctive shapes of the mounds, however, were not provided on the submitted site forms. Of these, 85 percent (n=6) contained shell, whereas one site, (16SMY6) was characterized specifically as an earthen mound. Shell middens associated with the mounds have been recorded at six of the sites: 16IB145, 16SMY3, 16SMY7, 16VM20, 16VM106, and 16VM107. The level of archeological investigation conducted at these sites was not sufficient either to confirm or deny the evidence of associated structures and no cultural features were identified. Temporal affiliations for the sites ranged from the Coles Creek period though the Mississippi period, and included evidence of Coles Creek, Plaquemine and Mississippian cultures. At least four, or 57 percent, of the single mound sites (16SMY3, 16VM20, 16VM106, and 16VM107) contained cultural resources which dated from a single temporal period or were listed as unknown, whereas the three remaining sites (16IB145, 16SMY6, and 16SMY7) evidently were occupied repeatedly.

A majority of the sites (n=5) were located on natural levees adjacent to bayous or on bayous. One of the sites (16SMY3) was situated on an island located at the confluence of Vermilion Bay and an unnamed bayou. The remaining site (16IB145) was located in a beach setting. Like the multiple mound sites, the single mound sites

were located along the margins of major distributary channels (i.e., Weeks Bayou, Bayou Sales, Bayou Cypremort, Onion Bayou, etc.). Only one of the sites (16SMY3) was located at the confluence of two water courses. Approximately 57 percent (n=4) lie within 2 km (1.24 mi) of a known shell bed.

Elevations for the sites are consistent, with a majority of them (n=6) situated at <1.5 (<5 ft) amsl. Only one site, 16SMY6, is located at a somewhat higher elevation at approximately 1.5 to 3 m (5 to 10 ft) amsl. Soils range from poorly drained Lafitte soils and marsh muck to Cypremort fine sandy loam (Figure 20 [located in the back pocket of this report]).

Prehistoric Village Sites

A total of 25 sites (16IB102, 16SMY31, 16SMY42, 16SMY79, 16SMY100, 16VM3, 16VM11, 16VM12, 16VM15, 16VM16, 16VM17, 16VM18, 16VM19, 16VM21, 16VM22, 16VM24, 16VM26, 16VM33, 16VM36, 16VM100, 16VM105, 16VM108, 16VM115, 16VM116, and 16VM118) classified as prehistoric villages are recorded in the three parish area covered by this study. Typically, these sites are characterized by *Rangia cuneata* and/or oyster (*Crassostrea virginica*) shell middens; these middens comprise up to 76 percent (n=19) of these prehistoric village sites. The remaining six sites were characterized as shell scatters (n=2), salt domes (n=3) or earthen sites (n=1). With the exception of Site 16IB102, all of the sites produced prehistoric ceramic sherds. Generally, prehistoric village sites are considered to have been occupied on a semi-permanent or seasonal basis (Altschul 1978; Pearson et al. 1989; Weinstein and Kelley 1992).

Sites 16IB102, 16SMY79, 16VM24, and 16VM36 contained unspecified quantities of lithic material, yet none of the sites produced evidence of cultural features such as post molds, fire pits, or hearths. The temporal affiliations for the sites ranged from the Coles Creek through the Mississippian periods, and they included Tchefuncte, Marksville, Troyville, Coles Creek, and Plaquemine components. Evidence of a possible Paleo-Indian period cultural deposit was identified at Site 16SMY79 with the recovery of a Clovis point. The Coles Creek culture is heavily represented at 72 percent (n=18) of the sites, while 39 percent (n=7) of these sites possibly were occupied repeatedly. The remaining sites exhibited multiple occupations by various cultural groups.

Fewer than 20 percent (n=5) of the village sites are situated along natural levees adjacent to bayous, whereas 12 percent (n=3) are on salt domes. Only three sites, 16SMY231, 16VM3, and 16VM24 are classified as being located on the beach. The locations of the remaining sites (n=14), although closely associated with a beach setting, are classified as chenier (n=2), marsh (n=8), islands (n=1), lagoon (n=2) or lake shore (n=1). Six of these sites (16SMY79, 16VM3, 16VM21, 16VM22, 16VM108, and 16VM115) are located at the confluence of either two bayous, the shoreline and a bayou, or a lake and a bayou. Slightly less than half, or 44 percent, of this site type appear to be associated predominantly with either the Vermilion River, large bays (Vermilion Bay and Cote Blanche Bay), or the larger bayous (Belle Island Bayou or Grand Island Bayou); however, the majority (n=14) are found along the smaller bayous (Onion Bayou, Herbert Bayou, Hog Bayou, Bayou Portage) and other unnamed distributary channels. Of the nine sites not situated directly on a waterway, only one is more than 1 km (0.68 mi) from water, with the remaining eight situated no less than 25 m (7.6 ft) and no more than 492 m (1,614 ft) from water. Approximately 56 percent (n=14) of these village sites lie within 2 km (1.24 mi) of a known shell bed location.

Elevations for the village sites are consistent throughout the three parish area along the coast, with a majority (n=22) lying at approximately <1.5 m (<5 ft) amsl. Only three sites (16IB102, 16SMY5, and 16SMY100) are situated at higher elevations. Site 16IB102 is situated at an elevation of approximately 15.3 to 23 m (50 to 75 ft) amsl, Site 16SMY100 rises to an elevation of roughly 1.5 to 15.3 m (5 to 50 ft) amsl, and Site 16SMY15 is found at an elevation of approximately 1.5 to 3.1 m (5 to 10 ft) amsl. Both Site 16IB102 and Site 16SMY100 are classified as salt domes, whereas Site 16SMY15 is located in a plowed field. Soils on which these village sites are found range from poorly drained Lafitte and Cloverly muck in the lower elevations to well

drained Memphis silty loam in the higher elevations (Figure 20 [located in the back pocket of this report]).

Shell Midden and Shell Scatter Sites

Excluding mound sites and village sites, approximately 42 percent of all sites (n=39) recorded in the area are classified as shell middens or shell scatters. These sites are characterized by the presence of *Rangia cuneata* and/or oyster (*Crassostrea virginica*) shell middens and ceramic sherds. These types of sites often are described as temporary 'camps' or 'extraction locales' (Pearson et al. 1989; Weinstein and Kelley 1992) used for specific purposes for short periods of time. In addition to the presence of shell and ceramics, three of the sites (16SMY118, 16SMY151 and SMY1156) also contained lithic material.

Shell midden and shell scatter sites have been associated with various landforms. A majority of the sites (n=27) either are located on or in close proximity to beachlines. These landforms often are described or listed on the associated site forms as cheniers (n=2), beach deposits (n=2), levees (n=2), islands (n=1), salt domes (n=1) marshes (n=2) or unknown (n=2). Sites located on natural levees adjacent to bayous and not associated with beaches comprise approximately 20 percent of the sites (n=8). The remaining 10 percent are associated with marsh (n=1), river levee (n=1), or other natural formations. In addition, 12 of the sites, or 31 percent, are situated at the confluence of watercourses. All of these sites are geographically situated on the beach and they include Sites 16IB21, 16IB152, 16IB154, 16SMY11, 16SMY17, 16SMY32, 16SMY150, 16SMY154, 16SMY155, 16VM1, 16VM5, and 16VM117. The remaining sites (n=27) either are located on bays (Atchafalaya Bay, Vermilion Bay, East Cote Blanche Bay) or on various bayous (Oyster Bayou, Bayou Garrett, Bayou Tech, Bayou Sale, etc.) within the coastal marsh. Only one site (16SMY27) is located any greater than 1.1 km (0.68 mi) from an existing bayou; a majority of these sites (n=13), however, are situated within 500 m (1,640 ft) of an existing bayou. Approximately 61 percent (n=24) of these sites lie within 2 km (1.24 mi) of a known shell bed.

The lack of relief along the coastline of this three parish area is confirmed by site elevation. A vast majority of the sites (n=36) are situated at elevations measuring less than 1.5 m (<5 ft) amsl. Only three sites are situated at higher elevations. These include Site 16SMY35 with an elevation of roughly 1.5 to 3 m (4.9 to 9.9 ft) amsl, Site 16SMY101 which lies at an elevation of approximately 1.5 to 15 m (4.9 to 49.2 ft) amsl, and Site 16SMY102, which is situated at an elevation of 1.5 to 4.5 m (4.9 to 14.8 ft) amsl. Both sites 16SMY101 and 16SMY102 are situated on landforms classified as salt domes, whereas Site 16SMY55 is located along the levee of Bayou Teche. Soils associated with these shell midden sites range from poorly drained Lafitte and Scatlake muck in the lower elevations to moderately well drained Richland silty loam in the higher elevations (Figure 20 [located in the back pocket of this report]).

Other Sites

A total of 19 archeological sites did not fit readily into any of the four previously described site classifications. The common denominator for these sites was a lack of an extensive shell midden deposit, artifact assemblage, and/or a historic cultural affiliation. A total of seven prehistoric sites, nine historic sites, and three multicomponent sites were included under the heading of "other sites."

Of the seven prehistoric sites identified, one (16SMY134) was characterized as a non-artifact producing shell midden; three sites (16IB146, 16SMY157, and 16SMY159) produced only lithic artifacts, one site (16SMY160) produced only ceramics, while two sites (16SMY158 and 16SMY162) contained both lithic and ceramic artifacts.

Sites with shell middens and shell scatters have been recorded on a variety of landforms. A majority of the sites (n=4) were located on levees associated with bayous. The remaining two sites (16IB146 and 16SMY162) were associated with salt domes. Although none of these sites were situated at the confluence of watercourses, all are geographically located within 500 m (1,604.4 ft) from a marsh (n=1), pond (n=1), or bayou (Bayou Sale [n=3] and Little Doctors Bayou [n=1]).

A majority of these sites (n=4) are situated at elevations less than 1.5 m (<5 ft) amsl. Only two sites are situated at higher elevations. These include Site 16IB146 with an elevation of roughly

10.7 to 15 m (35 to 49.2 ft) amsl and Site 16SMY162, which lies at an approximate elevation of 15 to 25 m (49.2 to 82 ft); both are situated on landforms classified as salt domes. Soils range from poorly drained Lafitte muck in the lower elevations to well drained Memphis silty loam in the higher elevations (Figure 20 [located in the back pocket of this report]).

Of the eight historic sites, Site 16IB110, is described as a mid-twentieth century historic camp site; Site 16SMY66 is characterized as a mid-nineteenth to twentieth century historic quarters complex; Site 16SMY74 consists of an artifact scatter associated with a mid-nineteenth to twentieth century house site; Site 16SMY167 is described as a late-nineteenth century saw mill and landing; Site 16SMY168 is an historic cemetery; Site 16SMY173 is a late nineteenth century historic artifact scatter; Site 16SMY177 is characterized as a late nineteenth to mid-twentieth century artifact scatter; and Site 16VM127 consists of a mid to late nineteenth century plantation structure.

All of the historic period sites also are located on rivers (n=1), bayous (n=3) or within approximately 400 m (1,312.4 ft) of a bayou. Five of the historic period sites are located on natural levees and two are associated with salt domes, whereas one is situated on the banks of an unnamed bayou. None of the historic period sites are situated at the confluence of watercourses.

Half of the historic period sites (n=4) are situated at approximately <1.5 m (<5 ft) amsl, whereas the other four sites are situated at higher elevations. Sites 16SMY74 and 16SMY167 lie at an approximate elevation of 0 to 3 m (0 to 9.84 ft) amsl; Site 16SMY168 is found at an elevation of approximately 4.5 to 7.6 m (14.8 to 25 ft) amsl; Site 16SMY102 lies at an elevation of roughly 1.5 to 4.5 m (4.9 to 14.8 ft) amsl; and Site 16VM127 lies at an elevation of 1.64 m (5.4 ft) amsl. Both sites 16SMY167 and 16SMY168 are classified as salt domes, whereas Site 16SVM127 is situated along the bank of the Vermilion River. Soils underlying these sites range from poorly drained Lafitte muck in the lower elevations to moderately well drained Richland silty loam in the higher elevations (Figure 20 [located in the back pocket of this report]).

Although all of the four multi-component sites contained evidence of prehistoric occupation, only one, Site 16SMY172, was dateable to the Coles Creek culture. The remaining sites (n=3) contained unidentifiable pottery sherds. One of the historic period sites, 16SMY172, contained an updateable historic component, whereas two sites, 16SMY161 and 16VM146, dated from the nineteenth century, and one, Site 16SMY132, dated from the mid-nineteenth to mid-twentieth century. Historic research suggested that Site 16SMY161 may have functioned as a residence for Jean Lafitte. Site 16VM146 may have served as a residence for Jim Bowie.

Similar to the prehistoric site patterning, a majority of these sites are located on either natural levees and/or associated with bayous (n=3). One site (16SMY161) is associated with a salt dome and Site 16SMY172 lies on Bayou Teche. None of the sites are situated at the confluence of watercourses.

Over half of the multi-component sites (n=3) are situated at roughly <1.5 m (<5 ft) amsl, whereas Site 16SMY161 is situated between approximately 18 to 22 m (59 to 72 ft) amsl. This would make Site 16SMY161 the highest site in the overall study area. Soils range from poorly drained Lafitte muck in the lower elevations to moderately well drained Richland silty loam in the higher elevations (Figure 20 [located in the back pocket of this report]).

Interpretation of the Data

The purpose of this study was to determine if extant models of settlement could establish a specific context for the interpretation of the proposed Marsh Island investigations. This study synthesized data from Marsh Island and a three parish coastal zone in an attempt to classify those data into specific types. Although some of the sites in this study area contain multiple cultural components, a vast majority fall within the Coles Creek and Mississippian period. Although previous data would indicate that a hierarchical settlement system existed within the region, few of these sites contained multiple components, thereby causing difficulties in identifying specific settlement trends. In addition, there was a strong observed correlation between site types and their location on the natural levees adjacent to major water courses (bayous and beaches) and available subsistence resources.

The Weinstein and Kelley (1992) model of semi-permanent and permanent villages, with single or multiple mounds, small agricultural hamlets, and resource extraction locales presents a simple and plausible explanation for the Mississippian period settlement of the region considered in this study. The single and multiple mound sites seem to represent occupation sites that possibly supported year round occupations. Weinstein and Kelley (1992) suggest that sites containing a single mound supported (or were subordinate to) the larger multiple mound sites (Weinstein and Kelley 1992). Semi-permanently occupied village sites were in turn associated with the less powerful single mound sites. At the bottom of the settlement hierarchy were temporary resource procurement, or extraction locals (i.e., shell midden sites). The 'other site' category described above likely includes locations of extremely limited or specific use.

The number of sites present in each category adds further support to the Weinstein and Kelley model. The model assumes that there would be fewer large centers of control than temporary extraction locals. The current organization of categories would support their conclusions; seven single mound sites and only one multiple mound site were identified. As classified here, multiple mound sites included two or more mounds. The recorded number of village sites (n=25) and shell midden sites (n=39) also fits this general assumption of the prehistoric settlement hierarchy.

Of special concern to this study is the distribution of these sites with regard to location and landform. Although approximately 21 percent of the sites (n=19) are recorded near the confluence of two water sources, reassessment of the maps accompanying the forms would indicate that this figure may actually climb as high as 76 percent (n=69). In addition, 97 percent of the sites (n=88) are located within 1.1 km (0.68 mi) from either a beach or bayou. Of particular interest is that 83 percent (n=76) are located on somewhat poorly or poorly drained soils that have an elevation of <1.5 m (4.9 ft). Very few viable landforms (i.e., salt domes) are available for settlement and almost all exhibit some form of habitation. Yet, availability to marine resources such as *Rangia* beds may have been the greatest consideration in human settlement along the coast. Approximately 50 percent (n=45) of the sites identified thus far are located within 2 km (1.24) of a known shell bed, while approximately 28 percent (n=24) of the identified sites are found within 1 km (0.62 mi).

Conclusions

Assuming that humans first occupied the Gulf Coast area about 12,000 years ago, it is reasonable to believe that during the next 3,000 to 4,000 years, big game hunters of the Paleo-Indian stage roamed across the then-exposed Pleistocene-age surface described above. Their culture and subsistence patterns, however, were such that they probably did not occupy these temporary settlements for any great length of time; hence, there would be few artifact concentrations to indicate human habitation. Even if such sites did exist, it is unlikely that they survived the marine transgression that eroded and inundated the surface between about 8,200 and 7,300 years ago. Viewed in another way, it is unlikely that any of the proposed construction activities would impact the Pleistocene surface which lies at a depth of 13.7 to 17.7 m (45 to 58 ft).

With the project area experiencing the marine transgression mentioned above, the presence of sites dating from the Early Archaic and from much of the Middle Archaic also can be precluded. The area was open Gulf and the shoreline was situated to the north of the project area. For the remainder of the 7,000 years of prehistory, the environments of the project area varied between interdistributary marsh and very shallow open water. Several cycles of deltaic progradation and regression occurred which were associated with the Maringouin complex and the Salé-Cypremort lobes of the Teche complex. These would have provided productive environments with abundant wildlife and fisheries resources, which undoubtedly were exploited. The environments, however, would not have been favorable for any type of habitation during the Archaic or Formative Stages. Distributary natural levees, which may have served as the only habitable areas, are not known to exist in the project area, either in surficial or subsurficial contexts. As seen above, the tidal channel natural levees were not large enough to accommodate settlements other than very short term encampments. Similar conditions prevailed offshore in the access and borrow area before the shoreline retreated through the area.

Clearly, the prehistoric peoples of the area occupied the types of landforms currently found within the project area. Combined with the presence of known shell reef locations along the northeast shore of Marsh Island and the presence of bayous, shell midden or shell scatter sites may possibly exist at the mouth of Hawkins Bayou and at the confluence of Bayou Blanc and Lake Sand. Unfortunately, neither of these areas are located within the project boundaries, thus, it can be said with reasonable certainty that no *significant* archeological sites of any age are predicted within any of the project items. The *most extensive* indications of prehistoric activity might be shell extraction areas occupied for a short time by very small groups.

Similarly, signs of historic occupation of the area are likely to be equally sparse. A few fishing or hunting camps may have been present along Bayou Blanc or along the shoreline of the island where access by boat would have been possible.

CHAPTER VI

FIELD METHODS AND RESEARCH DESIGN

Introduction

The Phase I cultural resources survey and archeological inventory of the proposed Marsh Island Hydrologic Restoration Project areas was designed to identify and record each prehistoric and historic period cultural resource located within the areas of potential effect. Fieldwork consisted of a marine remote sensing survey of the planned borrow site situated in East Cote Blanche Bay, and the examination of a project item located near the mouth of Hawkins Bayou (Figure 2, Sheets 1-3). In addition, a terrestrial cultural resources survey was conducted at each of nine proposed canal closures (1-9), at the cell closure at Lake Sand, and across the shoreline protection area situated between Hawkins Bayou and Lake Point (see Figure 2, Sheets 1-3). No cultural material was recovered during the Phase I cultural resources terrestrial and underwater survey of the proposed Marsh Island Hydrologic Restoration Project areas. The field methods utilized to complete each phase of this investigation are described below.

Marine Remote Sensing Survey

The marine portion of the remote sensing survey was conducted from July 20 - 25, 1998. The location of the project area was calculated using the Louisiana (South) State Plane Coordinate System, and it referenced the 1983 North American Datum (NAD-83). These data were obtained from NOAA Chart 11351, and from information provided by the U.S. Army Corps of Engineers, New Orleans District. Coordinates for the corners of the two survey areas were plotted using *Hypack* software. Survey coverage of the East Cote Blanche Bay and Hawkins Bayou project items was obtained along predetermined tracklines spaced 15.24 m (50 ft) apart.

The project area was divided into two survey blocks. Area 1, located in East Cote Blanche Bay, measured approximately 1,219 x 2,134 m (4,000 x 7,000 ft) in size, and it required 144 lanes of coverage; this totaled approximately 175.42 linear km (109 linear miles). The examination of Area 2, i.e., the Hawkins Bayou project item, was achieved along two survey transects; coverage totaled 1.19 linear km (0.74 linear mi).

The remote sensing investigation within the two Marsh Island project items was designed to identify all shipwrecks or other submerged cultural resources within the areas of potential effect. This survey utilized a remote sensing array that included a differential global positioning system, a digital-output recording proton precession marine magnetometer, a fathometer, and a digital side scan sonar (Figure 21). A notebook was maintained throughout the survey, in which information on field methodologies, survey vessel dimensions, the configurations of the remote sensing array, navigation antennae locations, cable lengths, sensor tow depths, instrument offsets and laybacks, instrument settings, noise to signal ratios, weather conditions, vessel speeds and courses, numbers of transects surveyed, preliminary inventories of magnetic and acoustic anomalies, and other miscellaneous observations were recorded. Upon completion of this investi-

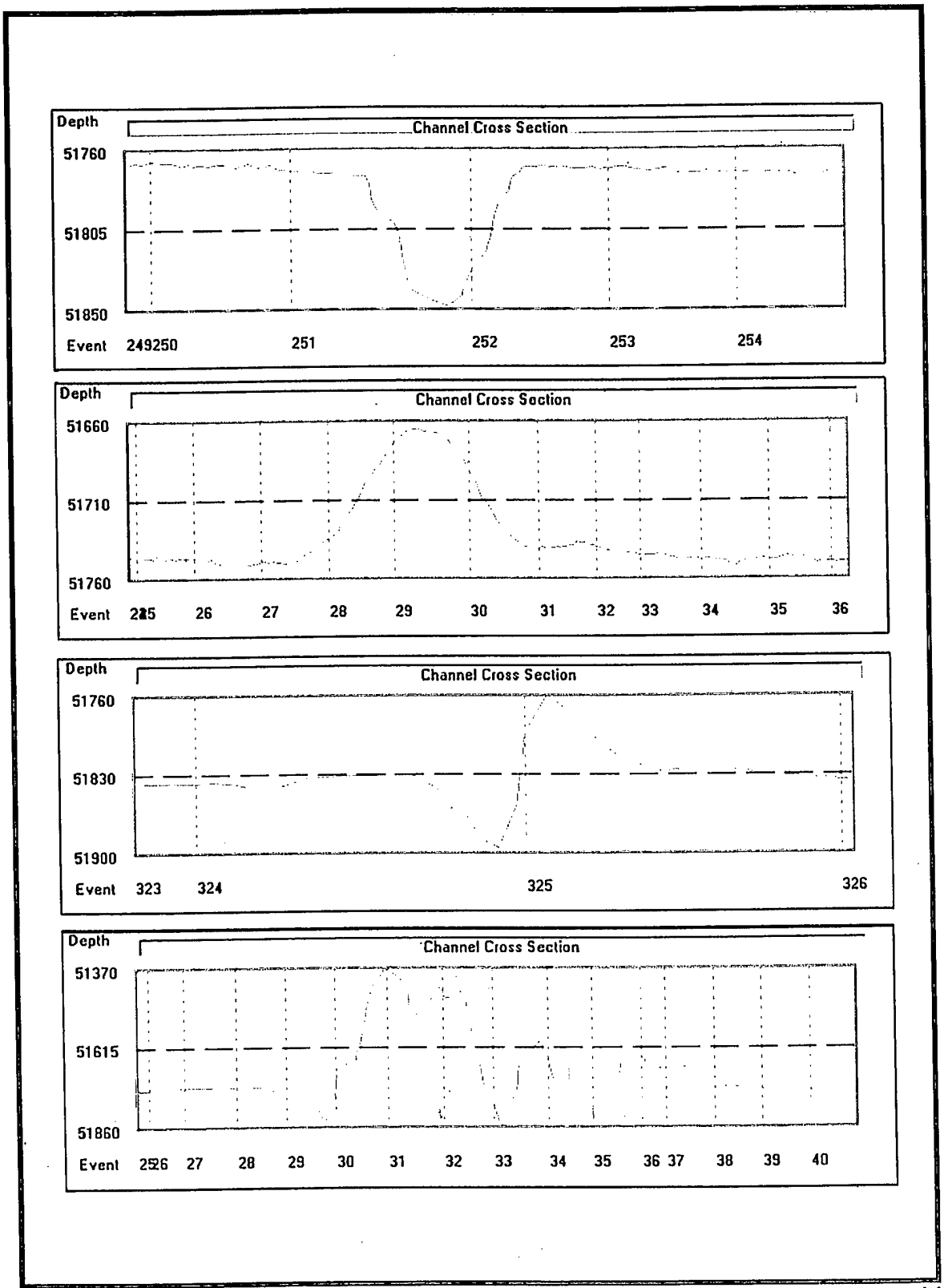


Figure 24. **Hypack "Edit" screen images illustrating magnetic anomalies with positive monopolar, negative monopolar, dipolar, and multicomponent signatures. The positive and negative signatures appear inverted because Hypack records the magnetic readings as "depths"; therefore, "higher" positive readings appear to trend downward rather than upward.**

gation, the digital survey data were post-processed and correlated with the field notes for analysis and interpretation.

Survey Vessel and Remote Sensing Instrument Configuration

This remote sensing investigation was conducted from the 6.71 m (22 ft) research vessel *Coli*, leased from the Louisiana Universities Marine Consortium (LUMCON); the vessel was captained by Mr. Sam LeBouef. *Coli* provided a stable platform from which to conduct the survey. The enclosed cabin of the vessel housed the navigational equipment, a laptop computer, the magnetometer recorder, sonar processor, fathometer display, and three persons, while the aft deck provided ample work space for deploying the magnetometer and side scan sonar towfishes.

The DGPS beacon receiver and GPS antenna were mounted above the wheel house, with the DGPS receiver offset 0.91 m (3 ft) starboard of the longitudinal centerline of the *Coli*. The GPS antenna, which received the satellite signals, was positioned 3.96 m (13 ft) forward of the stern, and 0.91 m (3 ft) to the port of the longitudinal centerline of the vessel. With the aid of a boom, the side scan sonar sensor was deployed off the port side roughly amidship, and roughly 1.31 m (4.28 ft) aft of the GPS antenna. During the survey, the elevation of the side scan sonar sensor was maintained at a constant level of 0.61 m (2 ft) below surface. The magnetometer sensor was towed from the port stern quarter of the survey vessel, with a layback of 19.2 m (63 ft) from the GPS antenna, and at a constant depth of 0.91 m (3 ft) below surface. The fathometer transducer was attached to a steel pipe mounted to the fantail of the *Coli* at a depth of 0.61 m (2 ft) below surface. A vessel speed of 4.5 to 5.1 kmph (2.8 to 3.2 mph) was maintained during survey

Positioning

Precise positioning of the detected anomalies was judged to be especially important since changes in the location of the proposed undertaking may be necessary to avoid adverse impacts to a particular feature, or for relocating targets if diver inspection is required. During this survey, a Differential Global Positioning System (DGPS) was used to provide real-time positioning for all navigation and position-fixing. Differential correction signals were received and they were processed using a Northstar 941-DX DGPS unit with an internal DGPS receiver. Corrected positions in WGS-84 geographic coordinates were transmitted in NMEA 0183 code to a computer-based navigation system; it consisted of an IBM Thinkpad Pentium computer running Coastal Oceanographic's *Hypack* (version 7.1) hydrographic survey software. *Hypack* performed instantaneous datum transformations from WGS-84 to NAD-83 state plane coordinates. During survey, *Hypack* displayed positions both numerically, via x/y coordinates and latitude/longitude, and by displaying the position of the vessel relative to the preprogrammed survey transects. This display provided a visual aid for conducting the survey. *Hypack* also logged the corrected positions in ASCII format, as well as the time of each position fix. All data collected from the remote sensing instruments were logged and time and position were noted. After completion of the survey, *Hypack* utilized the positioning files in post-processing to produce track plot maps and to derive the x/y positions for the previously logged data.

Coordinate Reporting

The coordinates of individual anomalies supplied in this text are reported in Louisiana (South) State Plane, and they reference the 1983 North American Datum (NAD-83); they also utilize the Lambert projection. The transformation of positioning data from the DGPS, supplied in WGS-84 format, to x/y State Plane coordinates, required a conversion from an ellipsoidal to a planar coordinate system. Since NAD-83, rather than the older North American Datum of 1927 (NAD-27), was used, no datum transformation was required. These distinctions, while small, can have an important effect on any subsequent efforts to reacquire any specific targets.

The State Plane Coordinate System of 1927 (so called because it was a planar system based on the North American Datum of 1927) was devised by the U.S. Coast and Geodetic Survey (USCGS) in the 1930s. Its purpose was to allow surveyors and engineers to compute accurate coordinates using plane trigonometry. Corrections to observed angles and distances are made to account for discrepancies between planar and ellipsoidal computations. Originally, tables of con-

stants were computed by USCGS using common logarithms. Later, Claire (1973) provided algorithms and constants for machine computations of such positions. These algorithms were designed to duplicate the results obtained using the tables and to be intentionally inaccurate to a slight degree to simulate the results obtained through hand calculation (Floyd 1985:5).

The State Plane Coordinate System of 1983 was necessitated by the 1983 adjustment of the North American Datum, a direct result of the accuracy that now is afforded by satellite positioning. For all practical purposes, NAD-83 and the global standard WGS-84 are identical and represent a vast improvement in accuracy over the old 1927 survey.

Magnetometry

The recording proton precession marine magnetometer is an electronic instrument that records the strength of the Earth's magnetic field in increments of nanoTeslas or gammas. Magnetometers have proven useful in marine research as detectors of anomalous distortions in the Earth's ambient magnetic field, particularly distortions that are caused by concentrations of naturally occurring and man-made ferrous materials. Distortions or changes as small as 0.5 gammas are detectable when operating the magnetometer at a sampling rate of one second. Magnetic distortions caused by shipwrecks may range in intensity from several gammas to several thousand gammas (Figure 22) depending upon factors such as the mass of ferrous materials present, the distance of the ferrous mass from the sensor, and the orientation of the mass relative to the sensor. The use of magnetometers in marine archeology and the theoretical aspects of the physical principals behind their operation are summarized and discussed in detail in Aitken (1961), Hall (1966, 1970), Tite (1972), Breiner (1973), Weymouth (1986), and Green (1990).

Ferrous deposits originating from natural and anthropogenic sources produce distinctive anomalous magnetic "signatures." For purposes of this discussion, these signatures are categorized as one of four types: positive monopole; negative monopole; dipolar; and multicomponent (Figure 23). Positive and negative anomalies refer to monopolar deflections in the ambient magnetic field. The polarity of the signature is dependent upon the orientation of the anomaly source relative to the magnetometer sensor, and whether its positive or negative pole is located closest to the sensor. Dipolar signatures display both rise and fall above and below the ambient field, with the dipolar deflection usually aligned along the axis of the magnetic field and the negative peak of the anomaly falling nearest the North Pole. Multicomponent or complex signatures are characterized as areas of general disturbance consisting of both dipolar and monopolar anomalies spread out over a relatively large area.

Numerous attempts to characterize the types of magnetic disturbances made by shipwrecks (Clausen 1966; Clausen and Arnold 1975:169) have been unsuccessful, because, as Gordon Watts observed, "the remains of vessels can be demonstrated to generate every type of signature and virtually any combination of duration and intensity" (Watts 1986:14). Murphy and Saltus (1990) warned that "the quest for a 'signature' for any particular wooden shipwreck is time ill spent...," and they point out that it is impossible to distinguish a genuine shipwreck site from one formed by "...cable, iron sewer pipe, and spikes" (Murphy and Saltus 1990:95). In fact, modern debris has been shown to generate virtually the same dipolar or multicomponent signatures as those produced by iron and steel hulled ships (Irion and Bond 1984; Irion 1986).

Some researchers, however, feel that progress has been made in developing an interpretive framework for analyzing magnetic data and for discriminating between modern debris and shipwrecks. In a major study conducted by Garrison et al. (1989) for the Minerals Management Service, two offshore lease blocks were surveyed with a transect interval of 50 m (164 ft). A three-dimensional contour map of the resulting anomalies was created, and divers inspected the sources of the anomalies. The objective of the study was to compile a sample inventory that would reflect a real population of shipwrecks or modern debris in the study area. The researchers concluded that the relationship of magnetic signatures and their spatial distribution is critical to determining patterns for shipwrecks and then discriminating these patterns from those of isolated modern ferromagnetic debris (Garrison et al. 1989:214). In essence, Garrison agrees with Arnold (1982) who stated that "the patterning of anomalies on ad-

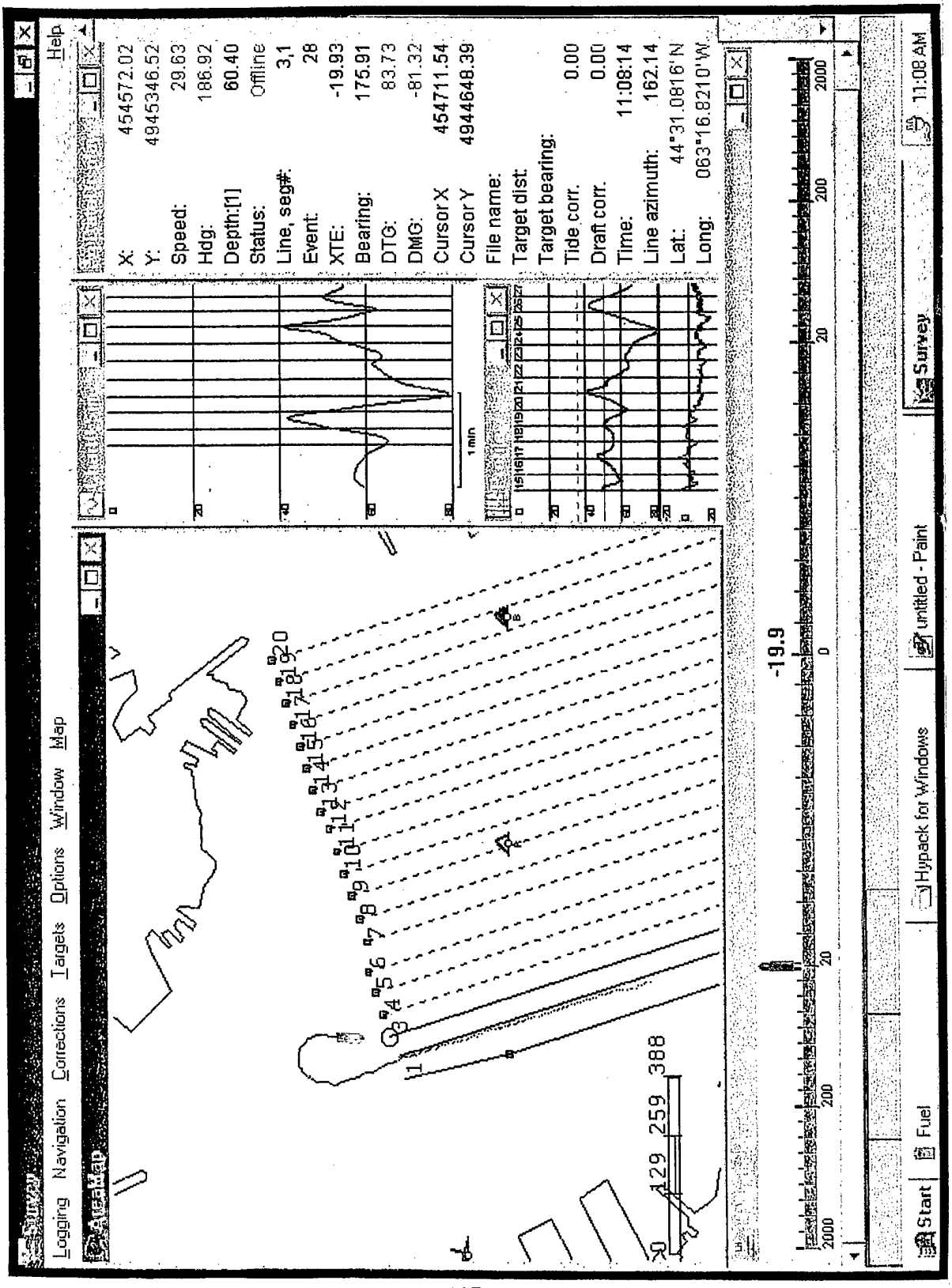


Figure 22. Hypack "Edit" screen image of data collection and navigation screen during a remote sensing survey of Halifax Harbor, showing vessel position, bathymetric, and magnetic data streams (courtesy of Coastal Oceanographic).

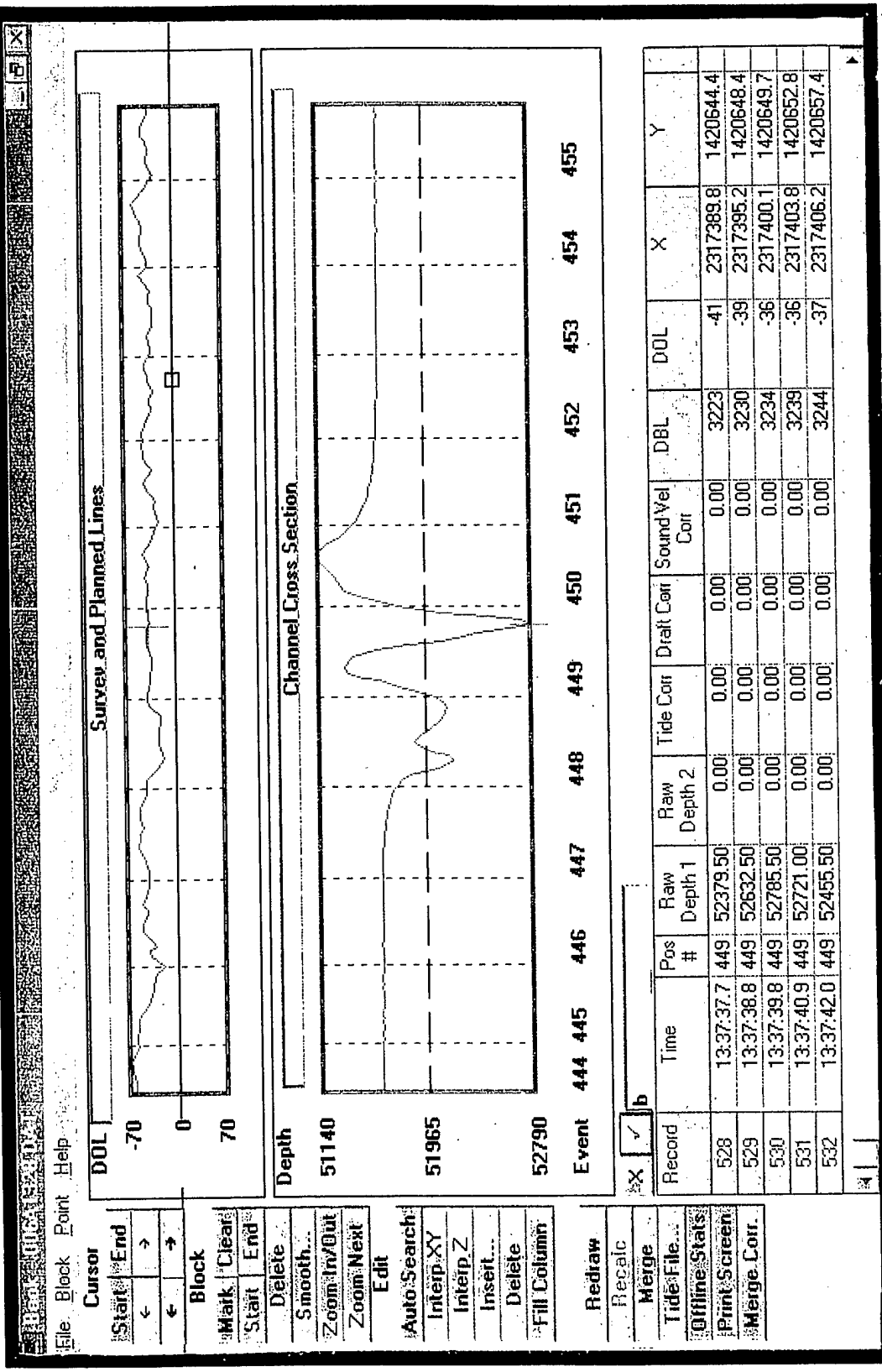


Figure 23. Hypack "Edit" screen image of a 1,650-gamma magnetic anomaly caused by the Hull remains of a ca. 1860 steamboat wreck discovered by R. Christopher Goodwin & Associates, Inc., during a recently completed remote sensing survey of the upper Yazoo River, near Greenwood, Mississippi.

joining survey tracks (spaced 50 m [164 ft] apart) is the key to identifying significant anomalies and distinguishing them from those far more numerous anomalies caused by isolated iron debris, which often show up only on one track" (Arnold 1982:179-216).

Lane spacing becomes a key component when attempting to distinguish the signature of a shipwreck from those of the debris that litters the bottom of most waters, and dissenting opinions argue that Garrison et al. (1989) and Arnold (1982) utilized intervals that were too wide for reliable detection of wrecks. In other words, with a lane spacing as wide as 45.73 to 50 m (150 to 164 ft), even shipwrecks may show up as a single anomaly rather than as a cluster, or a small ferrous mass might not show up at all, particularly if it is located midway between two widely-spaced survey lanes. The distance between the sensor and the anomaly source is critical, because the decrease in the intensity of an anomaly does not follow a straight arithmetic progression with increasing distance. Instead, intensity diminishes very rapidly as the inverse cube of the distance.

To appreciate more fully the effect that the distance between the sensor and the anomaly source has upon the amplitude of the magnetic deflection, a 992 lb. (450 kg) ferrous mass, such as an anchor, provides a useful example. In a survey conducted at a 30 m (98.42 ft) lane spacing, such a target located directly between two lines (15 m [50 ft] from the sensor) would yield an anomaly of at least 10 gammas (Murphy 1993:379). If the discovery of this type of feature is an objective of a survey, all anomalies of 10 gammas or more would have to be examined carefully. In contrast, at a distance of 7.5 m (25 ft) from the sensor (as obtained in a survey with a 15 m [50 ft] lane spacing), such a target would likely yield an 80 gamma deflection. Thus, with a tighter survey interval, the threshold at which an anomaly becomes potentially significant is somewhat higher than is the case for a survey in which a wider spaced survey interval is employed.

Recognizing the importance of minimizing the distance between sensor and source, the Submerged Cultural Resources Unit (SCRU) of the National Park Service in 1990 began advocating a maximum lane spacing interval of 30.48 m (100 ft) to achieve a high degree of certainty for the recognition of historic shipwrecks from their magnetic components (Murphy and Saltus 1990:94). Their reasoning was that during a survey with tightly spaced track lines, it is more likely that the magnetometer will pass directly over a large debris field at least once, and that its magnetic signature may be detected more easily over multiple lanes. In addition, magnetic sources with lower amplitude, but nonetheless significant, signatures also may be detected with narrower lane spacing. Even with a 30.48 m (100 ft) survey interval, however, additional survey work at tighter lane spacings may be required to define individual anomalies more clearly.

While attempting to identify conclusively the specific source of a particular magnetic signature, it may be impossible without archeological groundtruthing. Data collected during several close interval 7.62 to 15.24 m (25 to 50 ft) surveys conducted recently by R. Christopher Goodwin & Associates, Inc., has demonstrated that magnetic signatures can be characteristic of some types of targets. For example, when the sensor is close to an isolated, small ferrous object, the magnetic signature usually is a brief duration monopolar or dipolar deflection that occurs along a single survey transect. For larger, isolated ferrous objects, where the sensor is close to the source of the anomaly, the signature generally will remain mono or dipolar, however, it usually will have longer duration and higher amplitude, and it will appear on more than one survey transect. In contrast, when the anomaly source consists of a large area of ferrous debris (i.e., the disarticulated hull of a ship and its cargo or modern refuse), and the sensor passes directly over this area, the signature is likely to be multicomponent and it will consist of both monopolar and dipolar deflections resulting from the magnetometer sensor detecting the presence of individual ferrous objects comprising the debris field as it passes over them. Furthermore, multicomponent anomalies, caused by large amounts of scattered debris, will appear on multiple tightly spaced transects.

In instances where the magnetometer sensor passed over a relatively intact shipwreck and associated debris field, the signature typically will be a high amplitude, long duration, mono or dipolar deflection that is "embedded" or "surrounded" by numerous, smaller, shorter duration mono and dipolar deflections. Significantly, this

type of multicomponent signature changes markedly when the distance between the source and the sensor is increased. At a distance of 15.24 m (50 ft), the same anomaly source may no longer produce a multicomponent perturbation, but instead it may exhibit a large, but much lower amplitude and slightly shorter duration, single dipolar signature. When the distance from the source to the sensor is increased to 30.48 m (100 ft), the signature usually becomes a dramatically lower amplitude, significantly shorter duration, monopolar deflection. At a distance of 45.72 m (150 ft), magnetic evidence of the deflection source may be entirely absent, or so slight that it is obscured by low-level ambient magnetic noise.

As noted above, marine remote sensing surveys that are conducted with a transect spacing in excess of 30.48 m (100 ft) are now considered by many to be unreliable. Because of the potential for encountering the remains of small vernacular watercraft during the remote sensing survey of the Marsh Island project area, a 15.24 m (50 ft) transect interval was employed. With this tighter lane spacing, a shipwreck may be expected to yield a significantly larger number of anomalies over a given area. In addition, anomaly amplitude for many ferrous masses may be expected to be higher, because the shallow water depth and close lane spacing ensures that the magnetometer sensor will pass closely to any ferrous mass located within the project area. Theoretically (assuming perfect survey lanes), no anomaly on the river bed in this survey corridor would be positioned farther than approximately 7.62 m (25 ft) (half of the 15.24 m [50 ft] separation between survey lanes) from the sensor. Consequently, all but the smallest ferrous masses would be detected on multiple transects.

During the Marsh Island survey, precise measurements of the Earth's magnetic field were obtained using Geometrics G866 recording proton precession marine magnetometer. To achieve 0.5 gamma resolution, magnetic data were collected at a one-second sampling rate. These data then were output in NMEA 0183 code to one of four serial ports associated with the onboard navigation computer. The data was read by *Hypack* as a z value, time-tagged, recorded with its precise real-time coordinates supplied by the DGPS (x/y coordinates), and logged into the computer. The magnetometer sensor was towed at a distance measuring approximately 1.5 times the length of the survey vessel in order to eliminate any electromagnetic noise that may have been associated with the operation of the boat. Offset and layback distances between the magnetometer sensor and the GPS antenna were entered into *Hypack*, and the computer software corrected the position of each magnetic reading. Records for the survey were produced in digital format, and potentially significant anomalies and sources of spurious magnetic noise (i.e., bulkheads, refuse dumps, and iron outflows, etc.) were recorded in the field log as they were encountered and observed during the course of the survey.

Acoustic Imaging

Over the course of the past 25 years, the combined use of magnetic and acoustic (sonar) remote sensing equipment has proven to be the most effective method of identifying submerged cultural resources and assessing their research potential (Hall 1970; Green 1990). When combined with magnetic data, the near photograph-quality sonogram records produced by state-of-the-art side scan sonar systems have left little doubt regarding the identifications of some intact shipwrecks (Figure 24).

An Imagenex color imaging digital side scan sonar system was utilized during the Marsh Island survey to produce sonograms of the river bottom within the project corridor. The Imagenex system consisted of a Model 858 processor coupled with a Model 855 dual transducer operating at a frequency of 330 kHz. The sonar was set at a range of 27.43 m (90 ft) per channel, which yielded overlapping coverage of the study area. Sonar data were recorded on a 270 megabyte 8.9 cm (3.5 in) SyQuest cartridge drive, and a stream of time-tags was attached continuously to the sonar data to assist in post-processing the correlation of the acoustic and magnetic data sets. Acoustic images were displayed on a VGA monitor as they were recorded, and an observation log was maintained by the sonar technician to record descriptions of any acoustic anomalies, as well as the time and location they were detected. Anomalous acoustic targets were inventoried both during the survey and in post-processing.

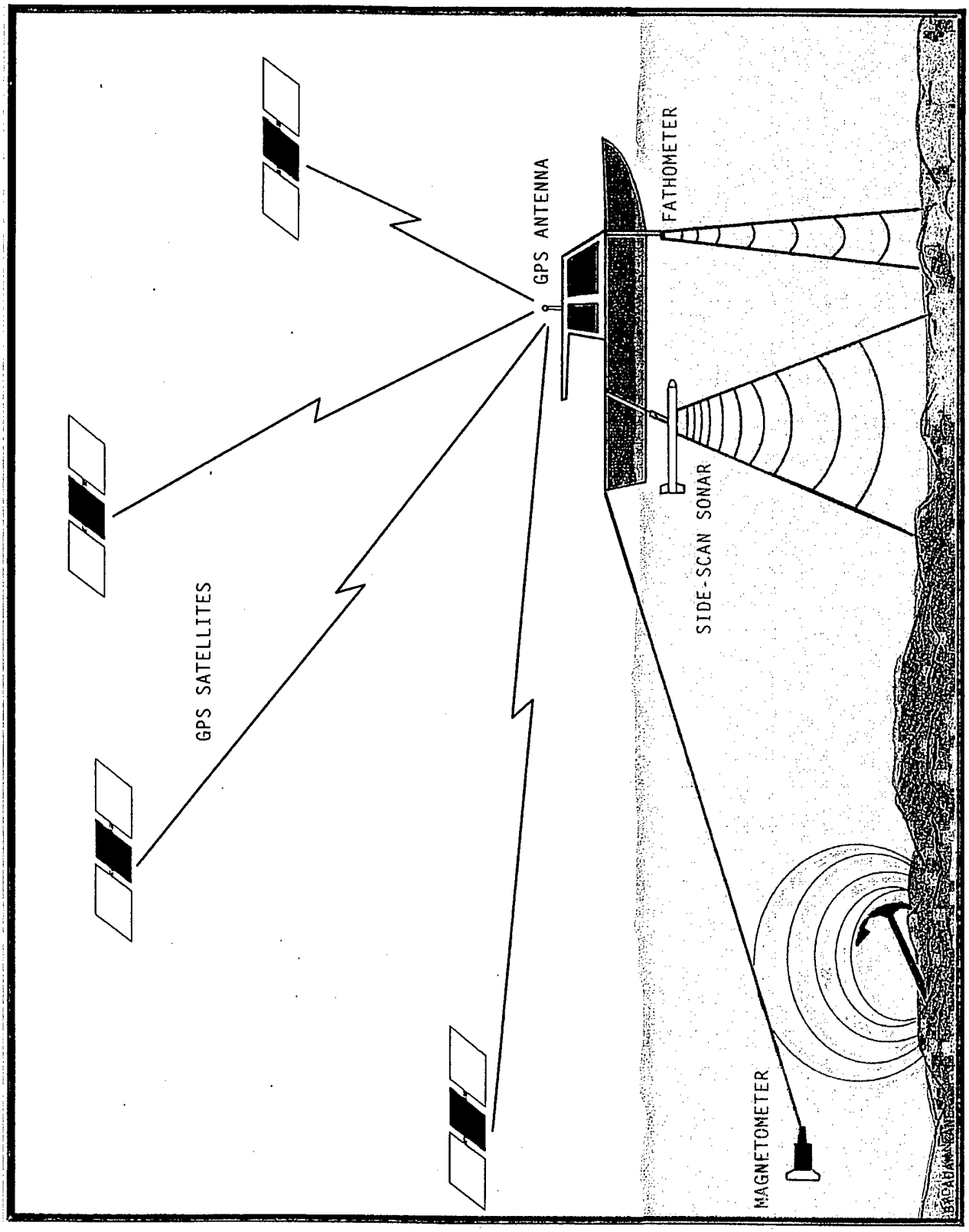


Figure 21. Drawing showing the array of remote sensing and positioning equipment utilized for the Marsh Island Survey.

Bathymetry

A Cetrek C-net Model 930-370 digital fathometer was used to record bathymetric data along each survey transect. Depths from the fathometer and real time locational data from the DGPS were transmitted in NMEA 0183 code to *Hypack* and recorded. *Hypack* also calculated transducer layback and offset values, and it made corrections to the bathymetric data. Bathymetric data were collected to assist in the identification and evaluation of the magnetic and side scan sonar targets.

Survey Control and Correlation of Data Sets

The *Hypack* survey software provided the primary method of control during survey. Survey lanes were planned, geodetic parameters were established, instruments were interfaced, and data were recorded utilizing this software. During survey, the course of the vessel relative to the planned survey line was monitored. In addition to providing steering direction for the helmsman, *Hypack* allowed the surveyors to monitor instruments and incoming data through additional windows on the monitor screen; the survey screen displayed a navigation chart with pre-planned tracklines, and various windows that were utilized for data monitoring (Figure 25). All remote sensing data were correlated with DGPS positioning data and time through *Hypack*. Positions for all data then were corrected through the software for instrument layback and offsets.

The methodology employed during survey produced favorable results, with reliable DGPS signals and clear acoustic images. All positioning and remote sensing equipment performed reliably throughout the survey, thus ensuring regular and evenly spaced coverage of the survey area.

Remote Sensing Data Analysis

Magnetic and acoustic data were analyzed while they were generated, and the data were post-processed using *Hypack* and Autodesk's *Autocad* (Version 12) software applications. These programs were used to assess the signature, intensity, and duration of individual magnetic disturbances, and to plot the tracklines of the survey vessel. Sonograms were analyzed visually and then correlated with the magnetic data using time and positioning information to determine the presence of any spatial relationships or congruence between the detected anomalies.

Terrestrial Survey

The Phase I cultural resources survey and archeological inventory of the terrestrial portion of the proposed Marsh Island project areas included pedestrian survey, visual reconnaissance, and systematic shovel testing of each project item. Transect survey was utilized to assure complete and thorough coverage of each project item, and to control the survey, site delineation, and archeological recordation process. Wherever possible, survey transects were placed along viable portions of the shoreline and along the opposing banks of the canal closures. Shovel testing generally occurred at 30 to 50 m (98.4 to 164 ft) intervals within the Shoreline Protection and Lake Sand Closure project items. An effort also was made to excavate at least two shovel tests within each canal closure project item.

The Scope of Work originally called for auger tests measuring 6.4 cm (2.5 in) in diameter. The field conditions, i.e., the presence of root bound loam at the surface and black to gray muck below, however, precluded the effective use of an auger. As a result, shovel tests were substituted for auger tests. Each shovel test measured approximately 30 cm (1.0 ft) in diameter and each was excavated to a depth of 100 cmbs (39.3 inbs), where possible. Each shovel test was excavated in 20 cm (8 in) artificial levels within natural strata, and the fill from each level was screened separately. Munsell Soil Color Charts were used to record soil color; soil texture and other identifiable characteristics were recorded using standard soils nomenclature. All shovel test fill was screened though 0.64 cm (0.25 in) hardware cloth, and each was backfilled immediately upon completion of the archeological recordation process. Shovel tests were not excavated in areas covered by standing water; a total of 31 shovel tests were excavated successfully as a result of this investigation.

A review of the state site files for the area situated within 8 km (5 mi) of the proposed Marsh Island Hydrologic Restoration Project areas failed to identify any previously recorded historic period standing structures. Archival research also determined that only three cultural

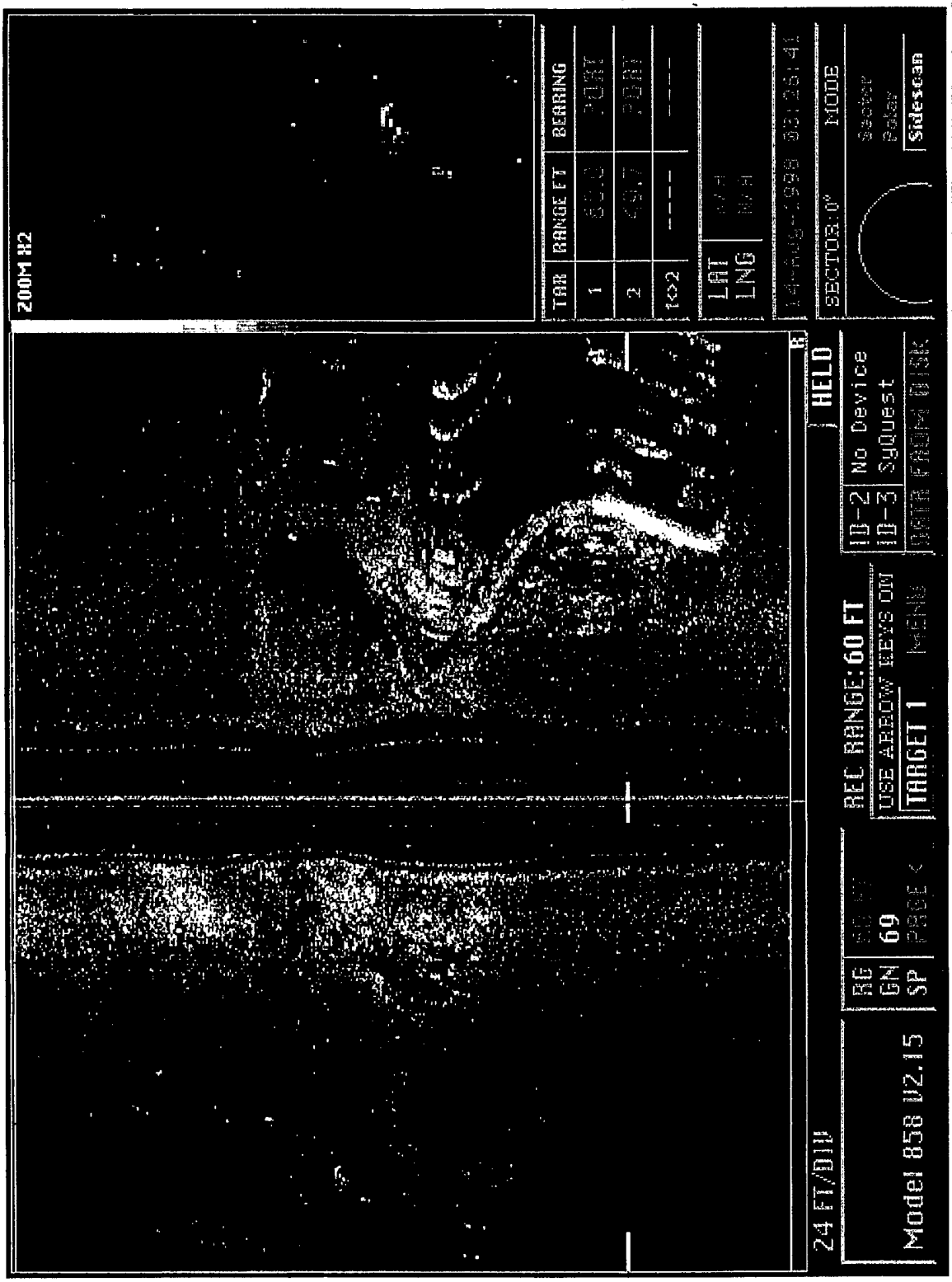


Figure 25. Imagenex 858 side scan sonar image of a submerged ca. 1940 barge discovered by R. Christopher Goodwin & Associates, Inc., during a recently completed remote sensing survey of the upper Potomac River, Alexandria, Virginia.

resources investigations had been completed within 8 km (5 mi) of the current project area. These included investigations by VanLopik and Saucier (1952), McIntire (1954), and Brown (1979) and they resulted in the recordation of six archeological sites (16IB14, 16IB21, 16IB51, 16IB152, 16IB153, and 16IB154); however, none of these sites were located within the 11 areas under examination or within 1.6 km (1 mi) of these proposed project items.

Evaluation of Site Eligibility

On the basis of the information collected during the field investigation and the subsequent analysis of the recovered data, each archeological locus or marine anomaly was assessed as not significant, potentially significant, or significant. The evaluation of archeological integrity and perceived research potential of each site or anomaly was determined by applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Archeological integrity was assessed by examining extant ground surfaces and noting evidence of site disturbance, by evaluating the relative magnitude of prior impacts to a site or anomaly, and by recording the soil profiles recorded in each excavated shovel test. Specifically, any evidence of soil mixing, erosion, dredging activity, mechanical excavations, and land use was noted.

CHAPTER VII

RESULTS OF THE PHASE I MARINE AND TERRESTRIAL INVESTIGATIONS

Introduction

Following a review of relevant archival information and an assessment of the results of each previously completed archeological investigation in the project region (see Chapter V), a Phase I cultural resources survey and archeological inventory was completed of each of the 2 marine and 11 terrestrial Marsh Island Hydrologic Restoration Project items. Marine remote sensing covered an area that encompassed approximately 175.42 linear km (109 linear mi) in East Cote Blanche Bay and approximately 1.19 linear km (.74 linear mi) of Hawkins Bayou. The terrestrial investigations included the Shoreline Protection and Sand Lake Cell Closure items, and nine canal closure items (canal closures 1-9); together they totaled approximately 105 ac (42.5 ha) in area.

A total of four potentially significant targets or anomalies were identified during the marine remote sensing of the East Cote Blanche Bay project item (Targets 1, 2, 4 and 11). Although the bankline portions of Hawkins Bayou will not be impacted by the proposed undertaking, the presence of an anomaly (Target 26) and visible wood pilings for a dock associated with a possible structure resulted in the terrestrial investigation of a limited area along the west bank of the bayou. This area was designated as Locus 1. The following discussion enumerates by project item the results of the current Phase I marine and terrestrial survey. Each of the archeological survey areas is depicted in Figure 2 (Sheets 1-3), and the results of the survey are presented in Tables 14 and 15.

Results and Data Analysis - Marine Remote Sensing Survey

The Phase I marine remote sensing survey project area was conducted on East Cote Blanche Bay and Hawkins Bayou in Iberia Parish, Louisiana. Approximately 176.61 linear km (109.74 linear mi) of bay/bayou bottom were surveyed for

Table 14. Project Items Examined during the Remote Sensing Survey.

PROJECT ITEM	7.5' QUADRANGLE/ UTM COORDINATES	SIZE	DISTANCE TESTED	SITES/LOCI IDENTIFIED
East Cote Blanche Bay	Lake Point 621427E 3267612N 622767E 3265805N 622584E 3268135N 623810E 3266483N	642.79 ac (260.13 ha)	175.42 km (109 linear mi)	4
Hawkins Bayou	Lake Point 622500E 3270924N 622563E 3271023N	13.64 ac (5.52 ha)	1.19 km (.74 linear mi)	None

Table 15. Project Items Examined during the Terrestrial Survey.

PROJECT ITEM	7.5' QUADRANGLE / UTM COORDINATES	AREA	SHOVEL TESTS EXCAVATED	SITES/LOCI IDENTIFIED
Additional Project Items				
Hawkins Bayou	Lake Point 622400E, 3270356N	0.208 ac (0.085 ha)	1	1
Shoreline Protection	Lake Point 623300E, 3270880N	4.13 ac (1.67 ha)	4	None
Lake Sand Closure	Bayou Blanc/Lake Point 621480E, N3272090	69 ac (27.9 ha)	3	None
Canal Closures 1-9				
Canal 1	Bayou Blanc 618530E, 3273060N	0.416 ac (0.169 ha)	2	None
Canal 2	Bayou Blanc 619260E, 3271130N	0.416 ac (0.169 ha)	2	None
Canal 3	Bayou Blanc 620320E, 3272020N	0.416 ac (0.169 ha)	2	None
Canal 4	Bayou Blanc 620720E, 3272050N	0.416 ac (0.169 ha)	2	None
Canal 5	Lake Point 622250E, 3271360N	0.416 ac (0.169 ha)	2	None
Canal 6	Lake Point 622390E, 3270900N	0.416 ac (0.169 ha)	2	None
Canal 7	Lake Point 623970E, 3270820N	0.416 ac (0.169 ha)	2	None
Canal 8	Lake Point 621380E, 3269570N	0.832 ac (0.337 ha)	4	None
Canal 9	Lake Point 621480E, 3268320N	1.04 ac (0.421 ha)	5	None

cultural resources (Figure 26). Water depths in the project area ranged from 0.91 to 3.05 m (3 to 10 ft). Activities common to the area include hunting, trapping, and fishing, as well as petroleum extraction. As a result of oilfield related activities, numerous crude oil heating structures, pumping stations, pipelines, and wellheads can be found in close proximity to the overall project area (Figure 27). Also, there were trotlines, floats, and a multitude of crab traps throughout the survey area.

Remote Sensing Results

The following discussion presents the results of Phase I marine archeological survey of the Marsh Island Hydrographic Restoration Project (TV-5/7), Iberia Parish, Louisiana. The marine remote sensing survey identified 147 magnetic anomalies (Appendix I and II), 38 acoustic anomalies (Appendix III and IV), and no bathymetric anomalies. The area of coverage is depicted by Figures 28 and 29.

Magnetic Data

Nearly all of the project area produced moderate levels of magnetic disturbance caused by modern anthropogenic activities. During survey, a number of modern features were identified (Appendix I and II). For example, a possible pipeline in the project area produced a high amplitude magnetic disturbance (1,934.0 gammas) of considerable duration (36.0 seconds) (Figure 30). Crab traps, which were found throughout the majority of the survey area, caused anomalous readings ranging from 10 to 300 gammas (Figure 31).

A total of four clusters of multiple magnetic anomalies were recorded during survey that could not be attributed to readily visible modern features. Targets 1, 2, 4, and 11 are all moderately high amplitude disturbances of medium to long duration. The amplitude, duration, and signal of these anomalies indicate that they have the potential to be significant, submerged cultural resources.

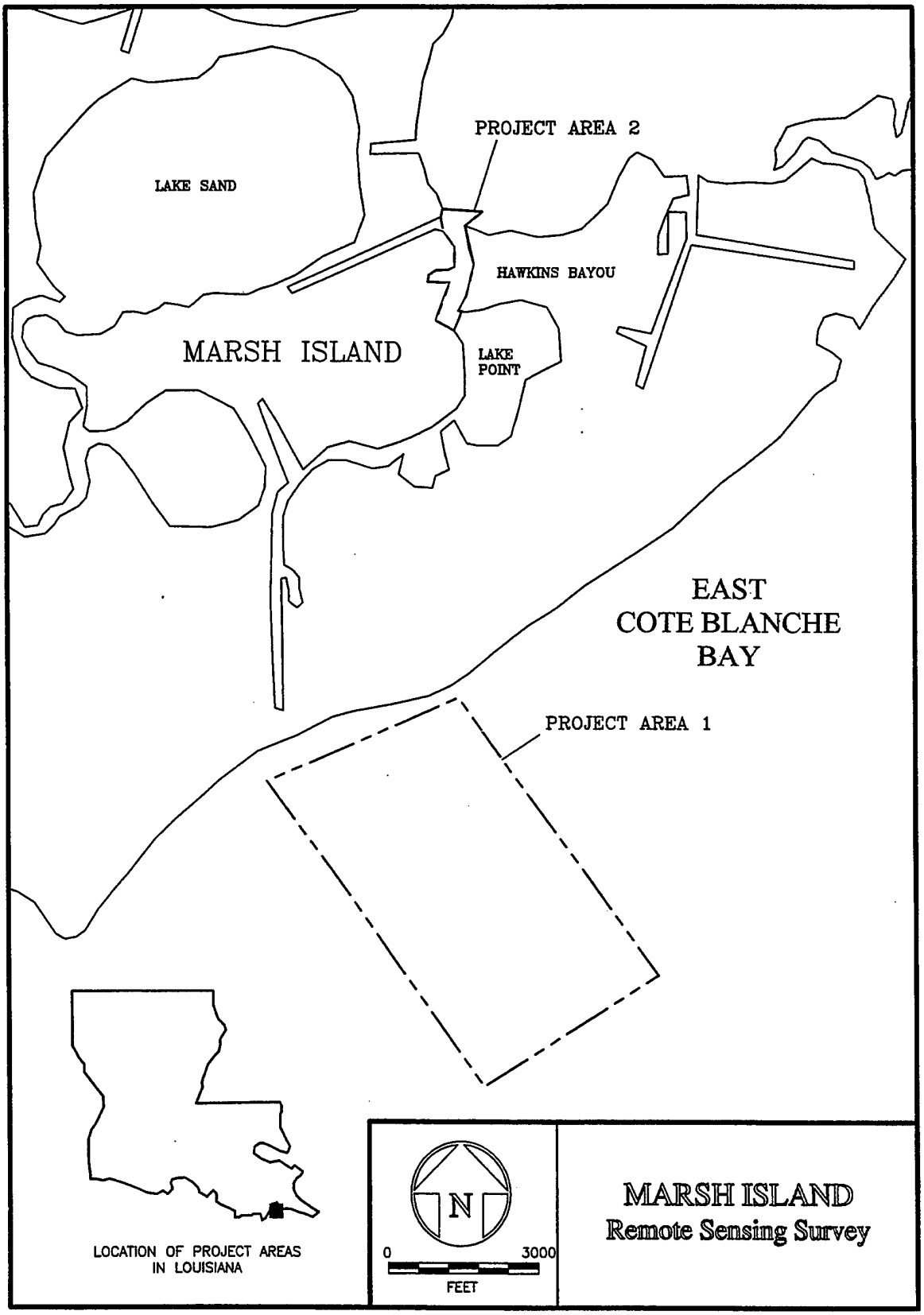


Figure 26. Map of the Marsh Island Hydrologic Restoration Project (TV-5/7), Iberia Parish, Louisiana, depicting the Hawkins Bayou and East Cote Blanche Bay underwater survey areas.

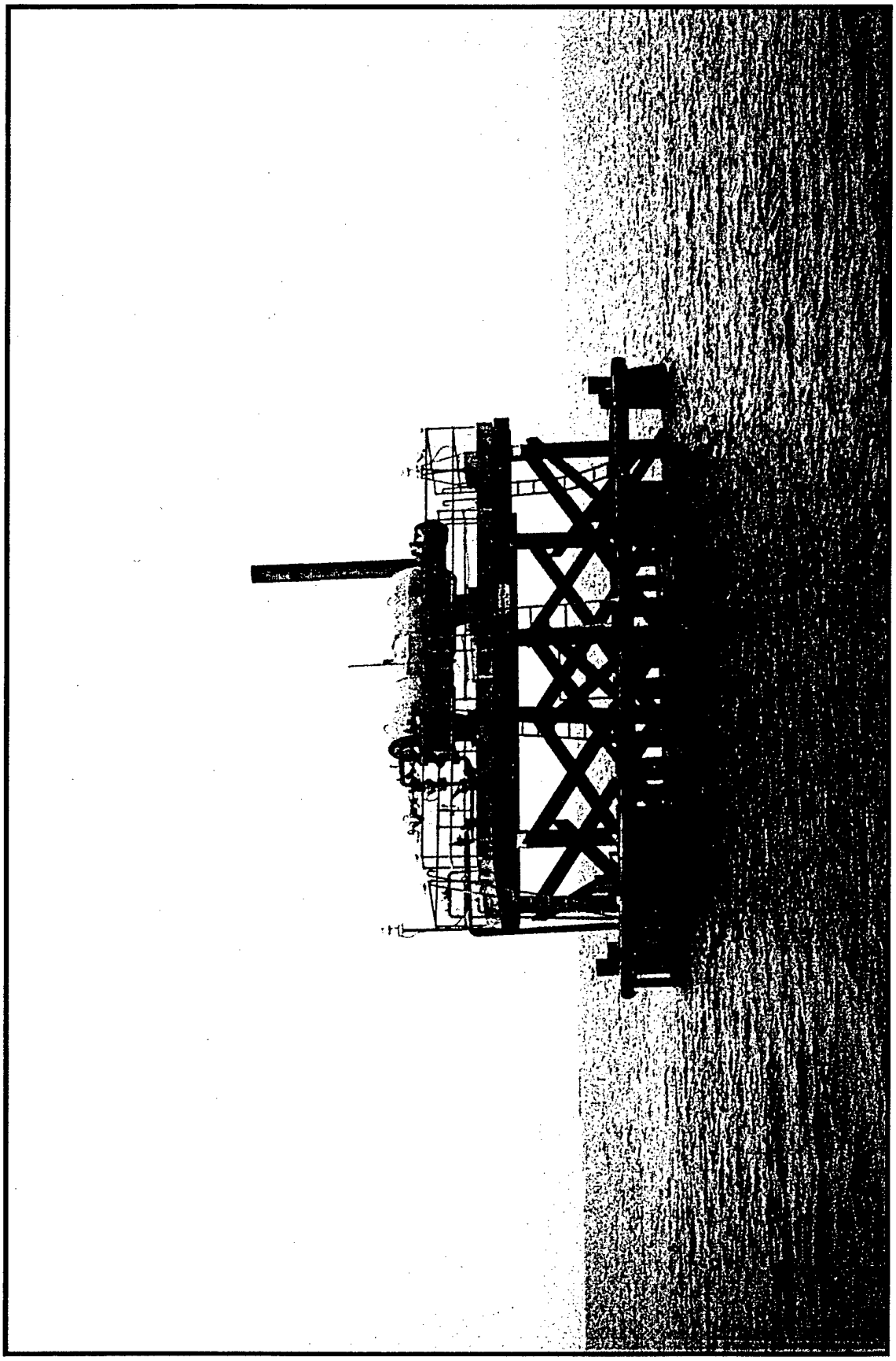


Figure 27. Photograph of the Hawkins Bayou survey area illustrating a possible source of magnetic disturbance: heating stations, pipelines, well heads, and pumping stations. (Pumping structure)

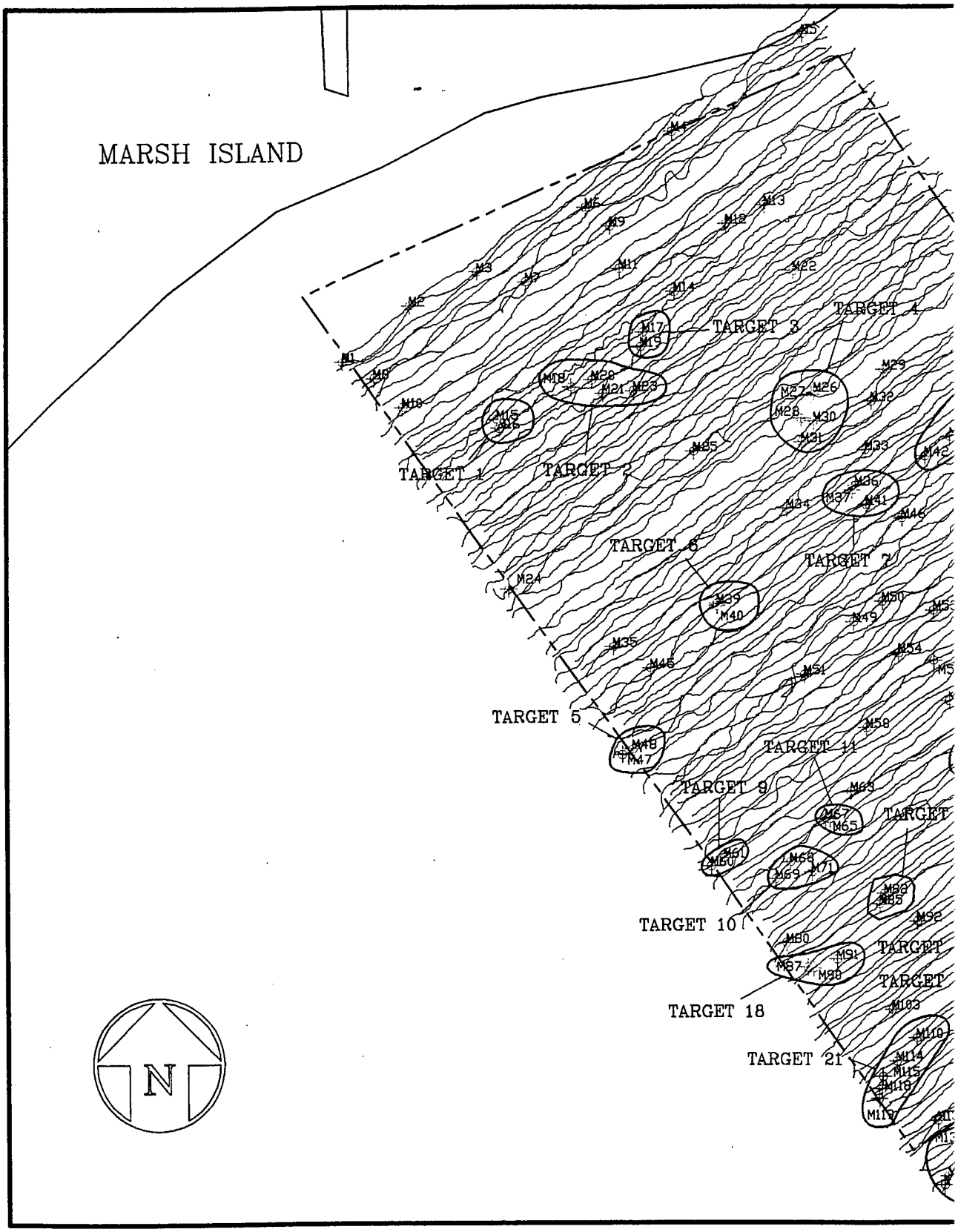
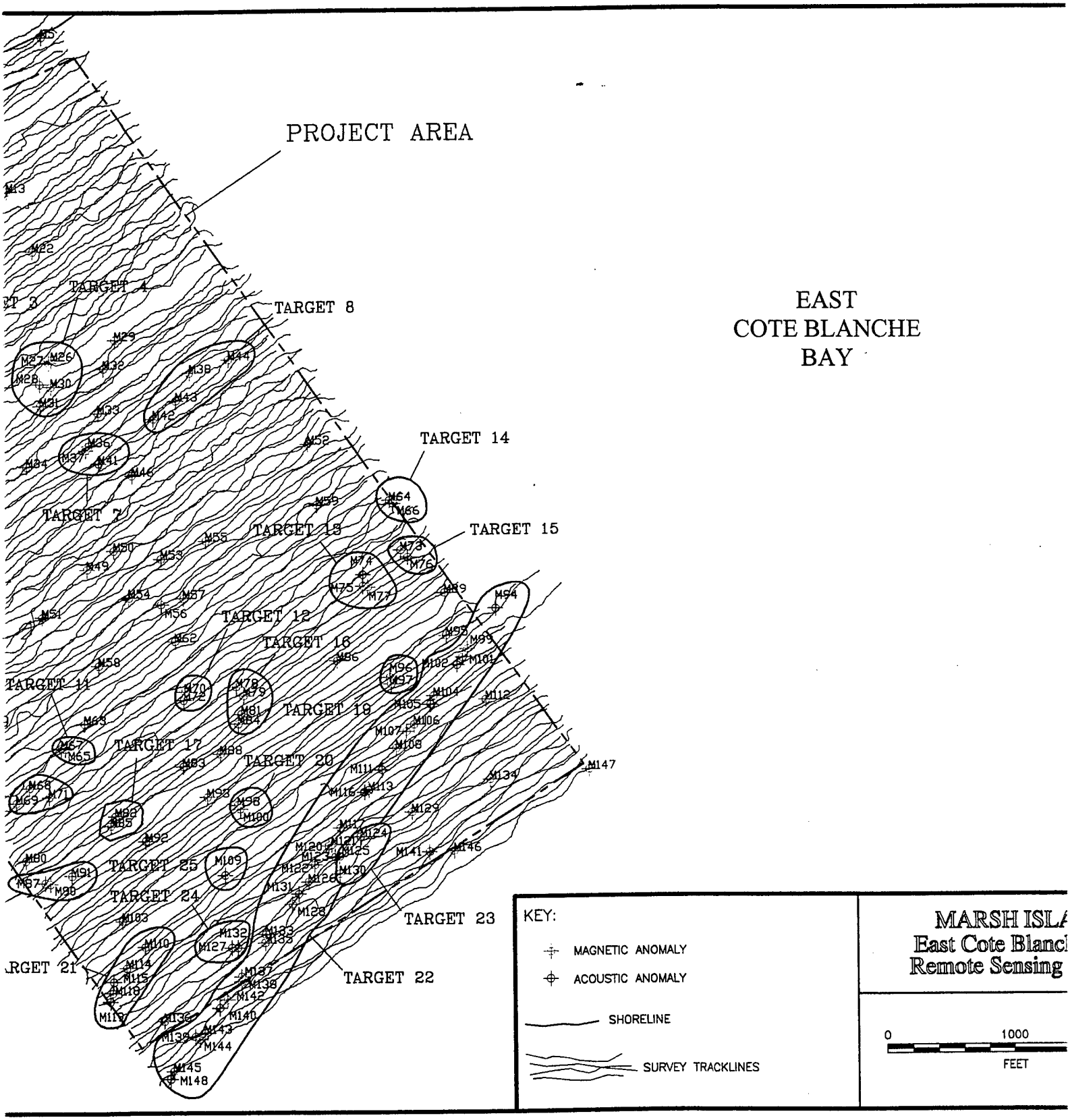


Figure 28. Map of the East Cote Blanche Bay underwater survey area (Block 1) depicting tracklines



) depicting tracklines, magnetic anomalies, and targets.

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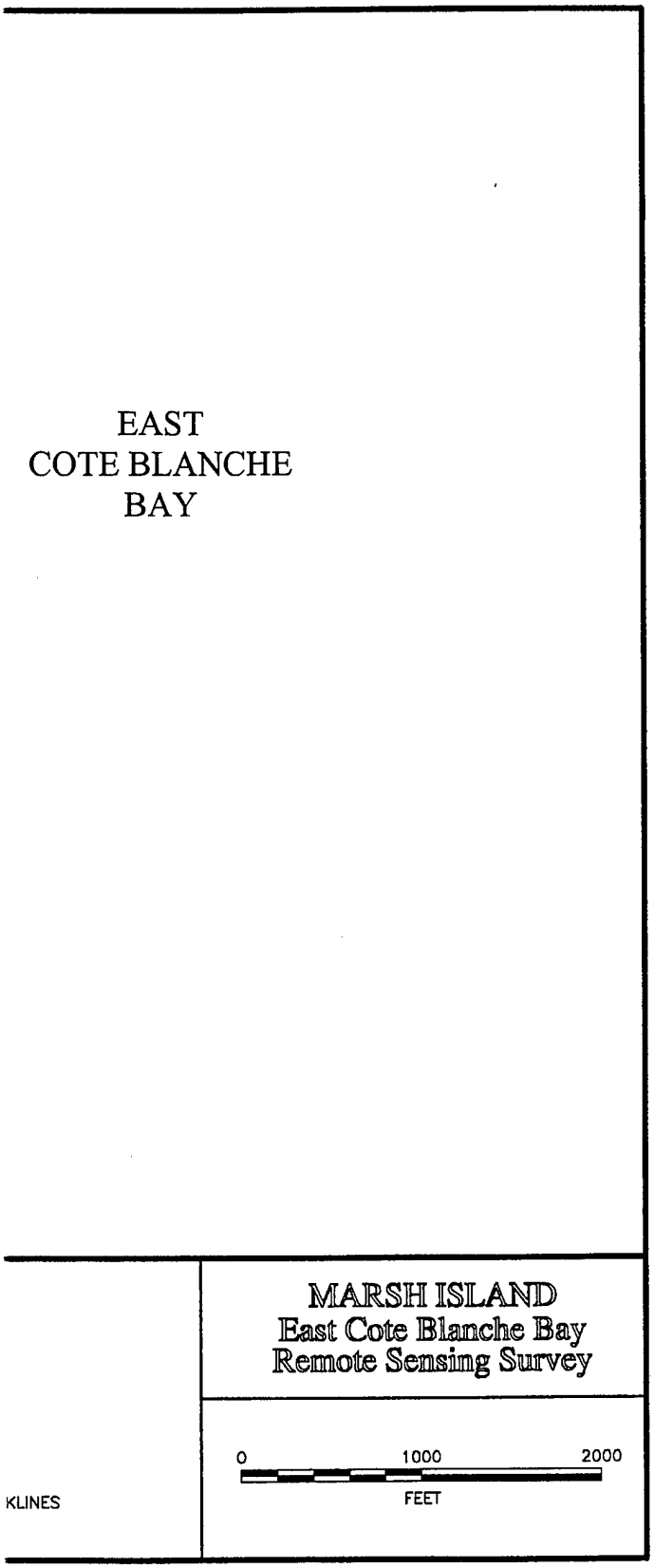
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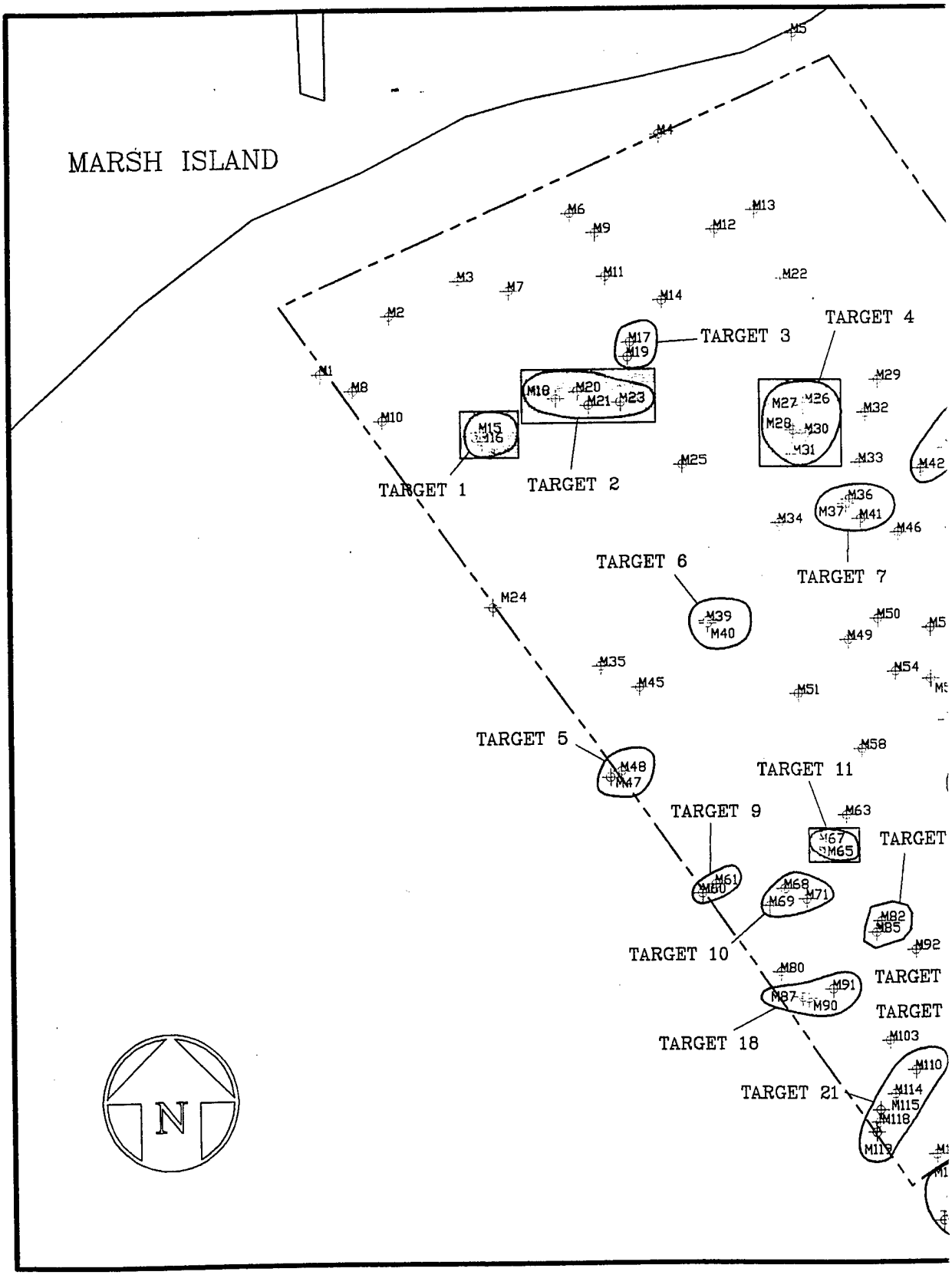
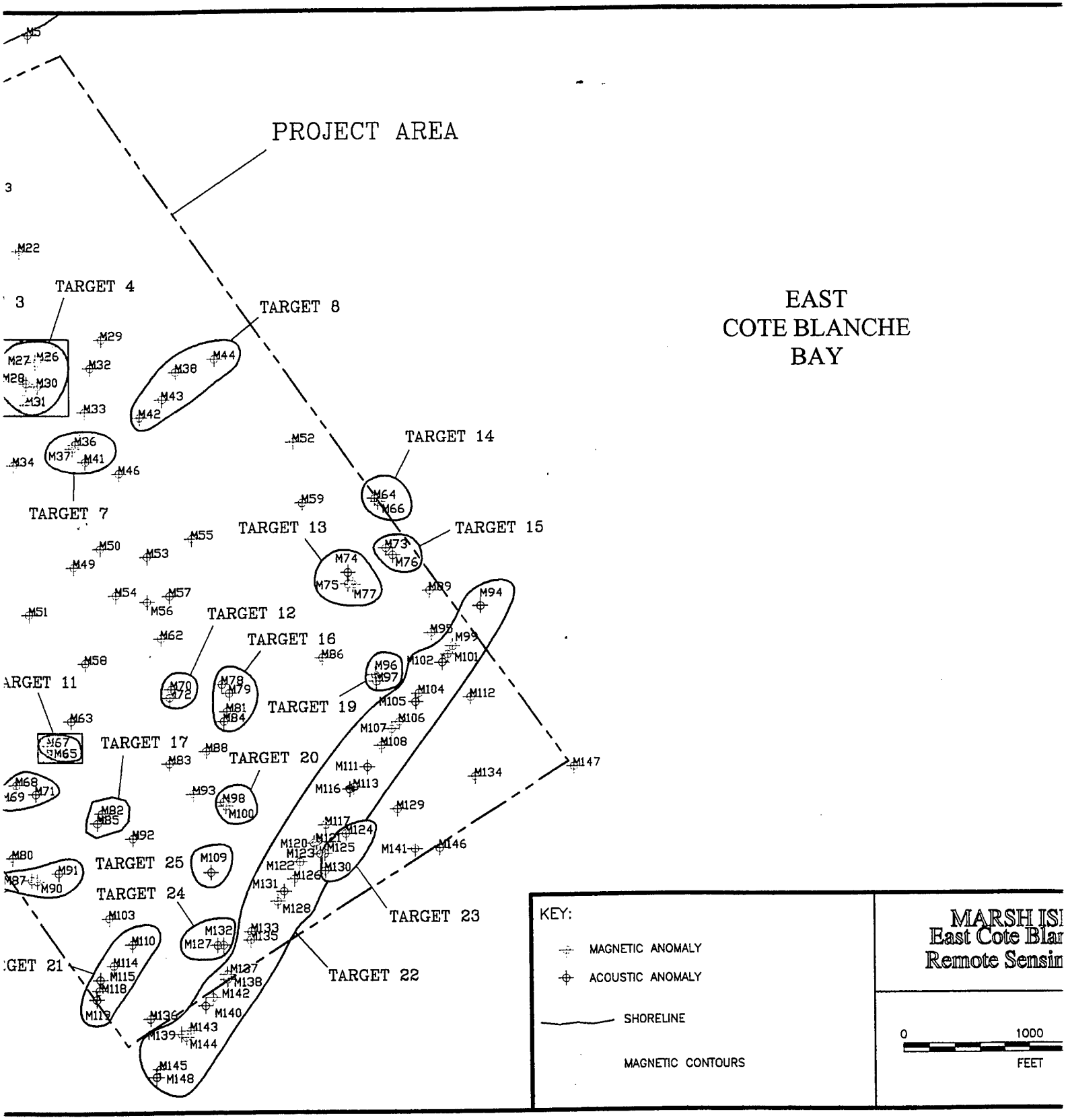


Figure 29. **Map of the East Cote Blanche Bay underwater survey area (Block 1) depicting magn 11 magnetic contours.**



x 1) depicting magnetic anomalies, and Targets 1, 2, 4, and

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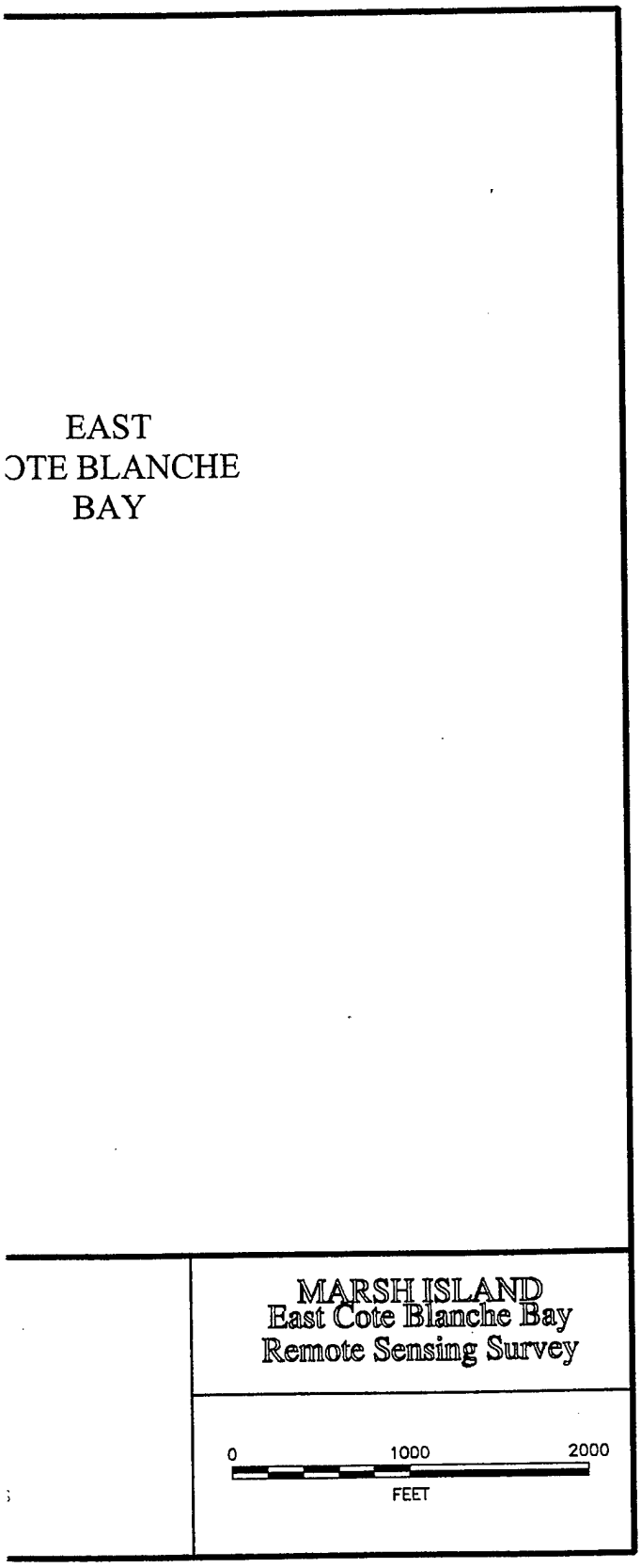
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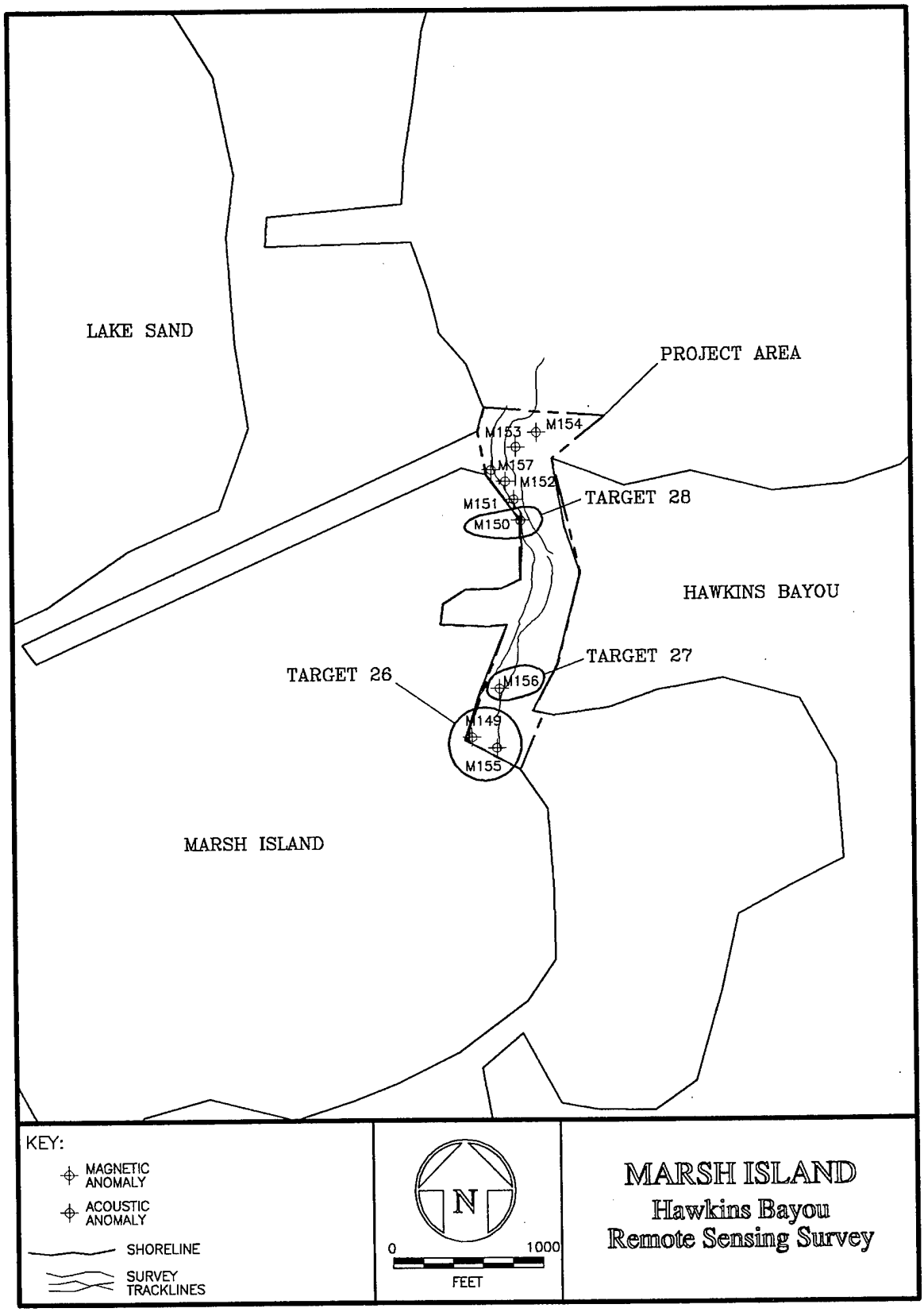


Figure 30. Map of the Hawkins Bayou underwater survey area depicting tracklines, magnetic anomalies, and targets.

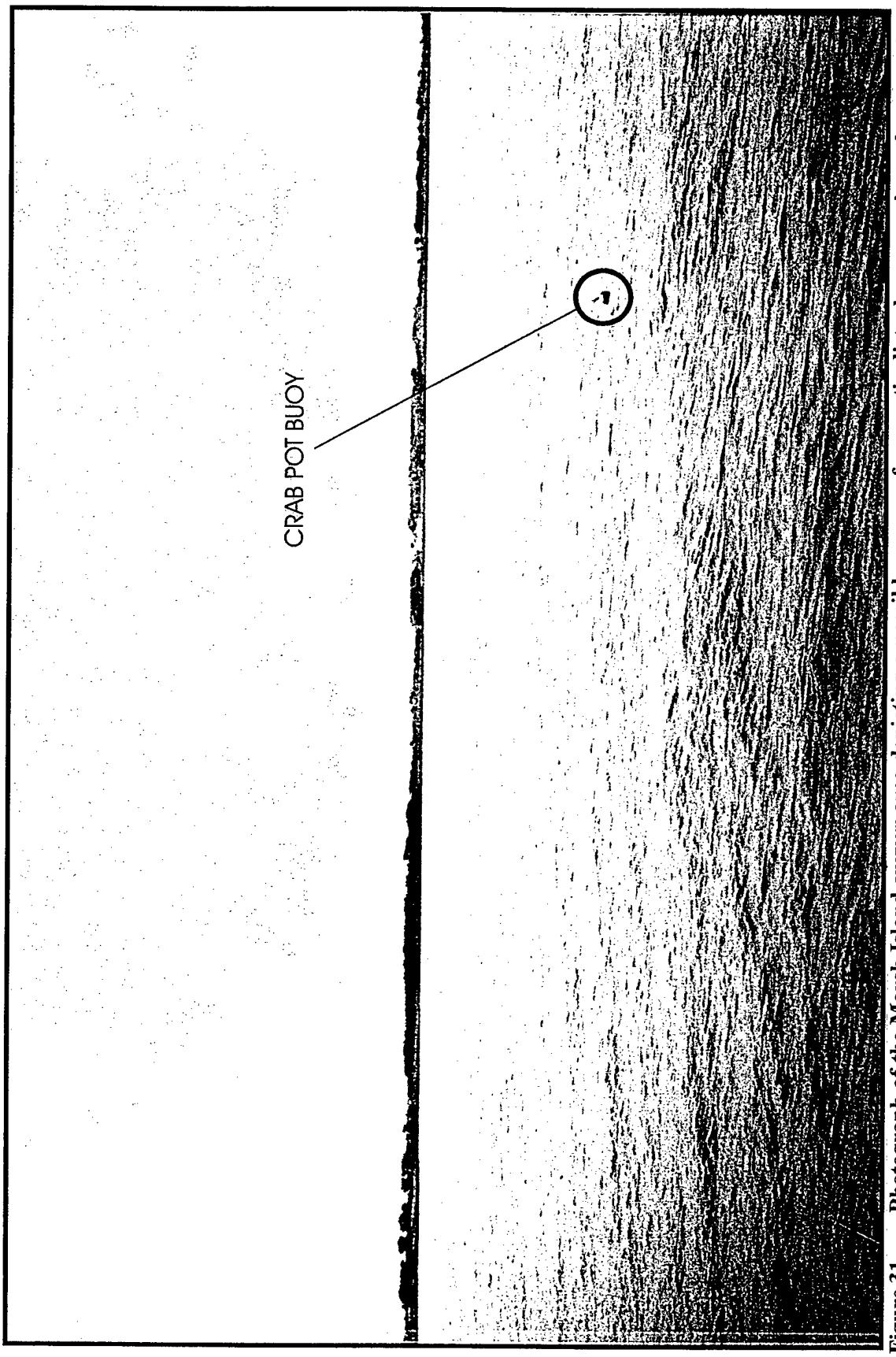


Figure 31. Photograph of the Marsh Island survey area depicting a possible source of magnetic disturbance: crab pot buoy marking iron crab traps.

Acoustic Data

A total of 38 acoustic anomalies were detected during the side scan survey of the project area (Appendix 3 and 4). These anomalies fell into two categories: modern features visible from the survey vessel [A6, A7, and A37], and isolated targets that appeared to be modern debris [A10, A11, and A13]. All of these anomalies appeared to be associated with the aforementioned pipeline.

Bathymetric Data

No bathymetric anomalies were recorded during the Marsh Island marine remote sensing survey. Water depths throughout the East Cote Blanche Bay Project Area ranged in depth from 0.91 to 3.05 m (3 to 10 ft), whereas water depths in Hawkins Bayou averaged approximately 3.05 m (10ft).

Data Analysis

In the following discussion, 27 magnetic clusters, or targets, are described. Each target is assessed, its likelihood for representing a significant submerged cultural resource is evaluated, and management recommendations are provided. Individual magnetic anomalies from Survey Area 1 and 2 are quantified in Appendix 1 and 2. In considering the anomalies, water depth, lane spacing, magnetic deflection, duration of deflection, and proximity to observed manmade materials and structures all were taken into account. As noted above, the use of this area by the fishing industry resulted in the identification of traps, trotlines, and marker buoys. The shallow water in the survey areas brought the ferrous material associated with these objects closer to the magnetic sensor, thereby enhancing the magnetic deflection of the crab traps and trot lines.

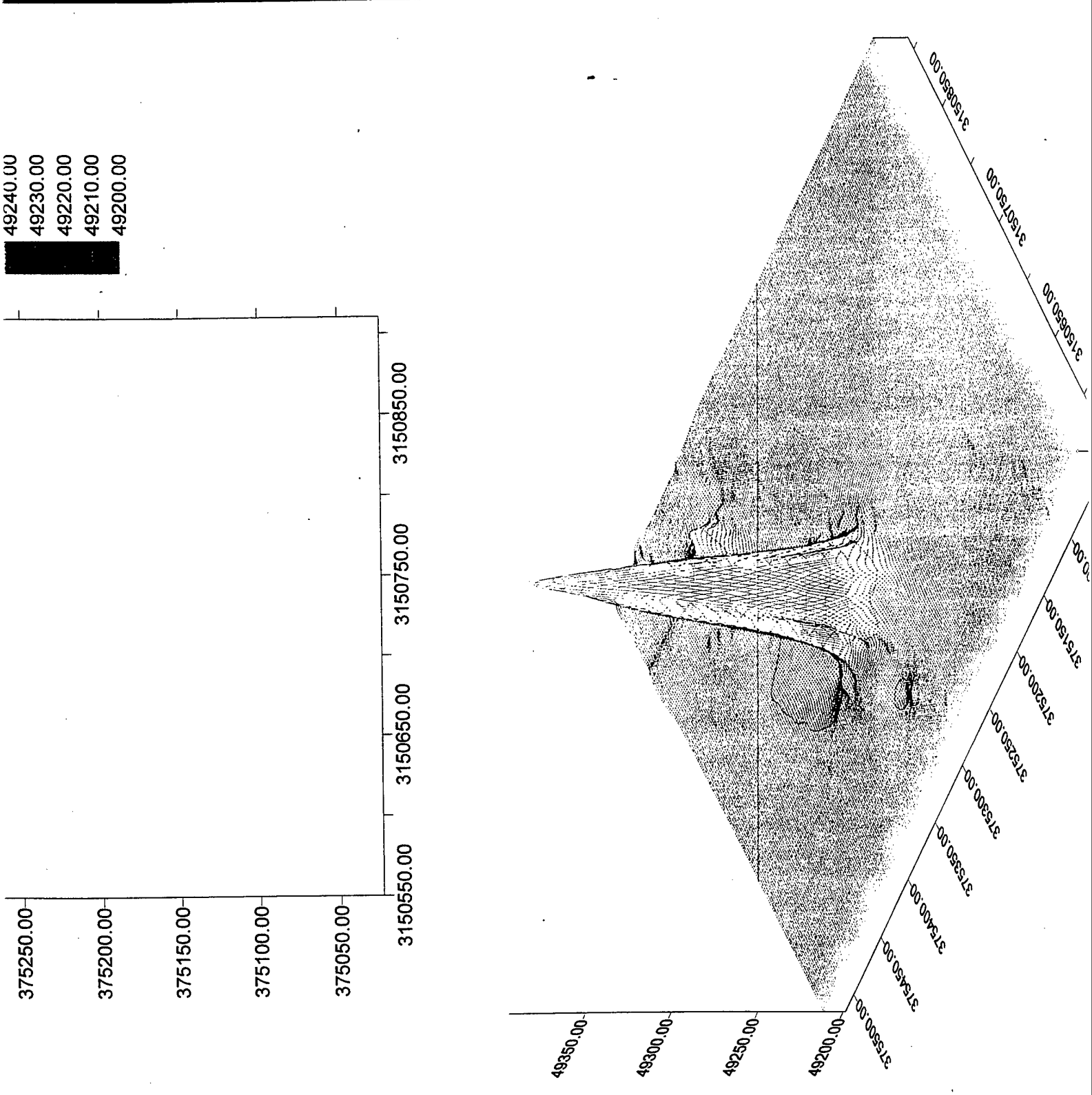
Target 1

Target 1 consists of two magnetic anomalies (Anomalies M15 and M16) (Figure 32). M15 is a low amplitude (14 gammas) negative monopolar magnetic perturbation of moderate duration (17 seconds). Magnetic anomaly M16 is a high amplitude (185.7 gammas) positive monopole of a moderate duration (26.0 seconds). The lack of a correlative acoustic anomaly makes the identification of the point source of this/these magnetic perturbations impossible. Although M15 has a relatively low amplitude, its duration is long enough that it deserves consideration. At a vessel speed of 3 knots (roughly 1.54 m [5.05 ft] per second), an anomaly with a duration of 17 seconds covers any area of approximately 25.91 m (85 ft), suggesting a sizable source. The high amplitude and longer duration of anomaly M16 suggests that it may represent a significant cultural resource. The anomalies are separated by about 19.51 m (64 ft), suggesting that they should be considered together. This cluster is considered to have a moderate potential for representing the remains of a watercraft, and it deserves further evaluation. Diver examination or the avoidance of Anomalies M15 and M16 is recommended.

Target 2

Target 2 consists of four dipolar magnetic anomalies (M18, M20, M21, and M23) (Figure 33). While magnetic anomalies M18, M20, and M21 are perturbations of high amplitude (513.5, 230, and 135.5 gammas, respectively), M23 is an anomaly of medium amplitude (68.0 gammas). Magnetic anomalies M18 and M21 are considered to be of medium duration (14.0 and 13.0 seconds), whereas M20 and M23 are somewhat shorter (8.0 seconds each). Without a correlative acoustic anomaly to evaluate, the four magnetic anomalies that form Target 2 are virtually impossible to interpret. Distances between individual anomalies range from 36.58 to 66.14 m (120 to 217 ft), while the group as a whole covers a distance of approximately 133.51 m (438 ft). The amplitude, duration, and clustering of these magnetic anomalies suggest that they deserve further evaluation. Because the water depth in the vicinity of these four anomalies is only 1.25 m (4.1 ft), the source of these perturbations would be positioned fairly close to the magnetometer sensor and thus even a small ferrous source might produce a relatively large amplitude reading. Nevertheless, the characteristics of this cluster are similar to those that previously have been associated with other significant, submerged cultural resources. Further evaluation of anomalies M18, M20, M21, and M23 (Target 2) is recommended. Based on their length of magnetic signal duration, anomalies M18 and M21 should be evaluated first. If these evaluations are negative, and no cultural resources are detected, investigation of the remaining anomalies would not be warranted.

Figure 32. Magnetic contour plot of Target 1.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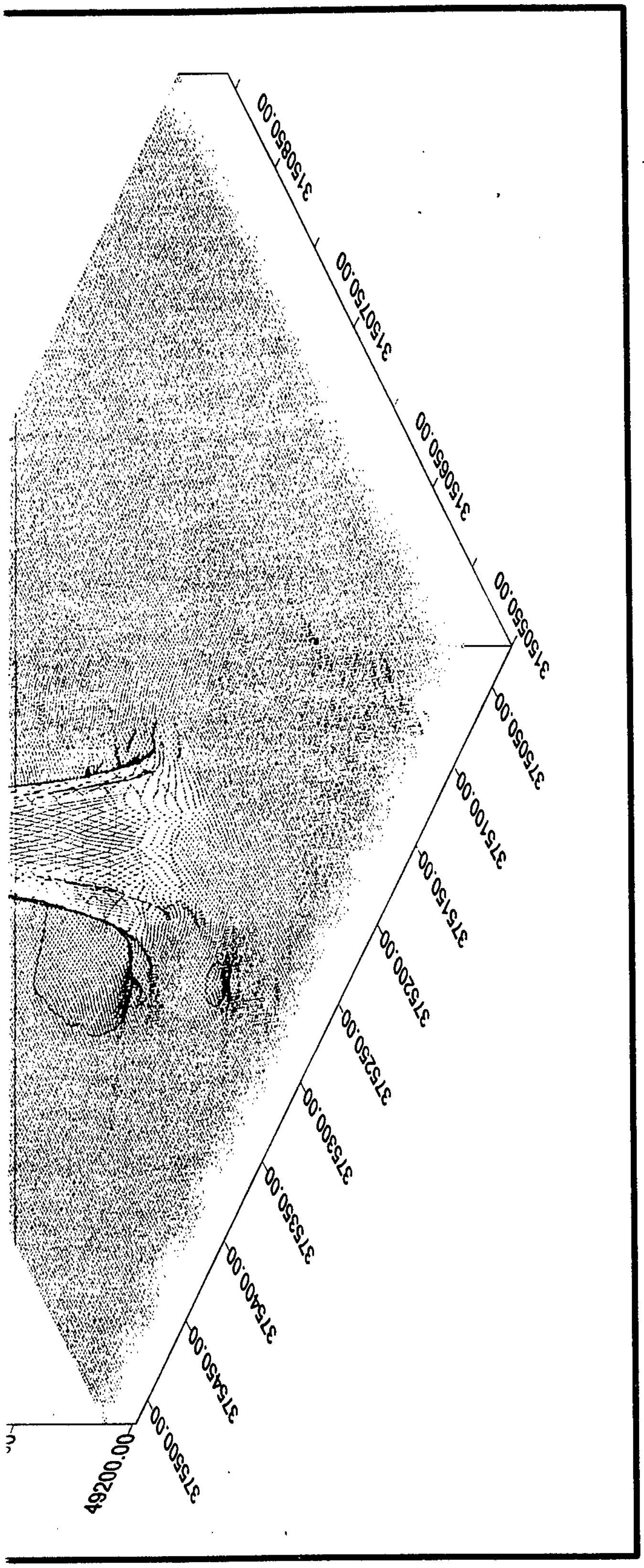
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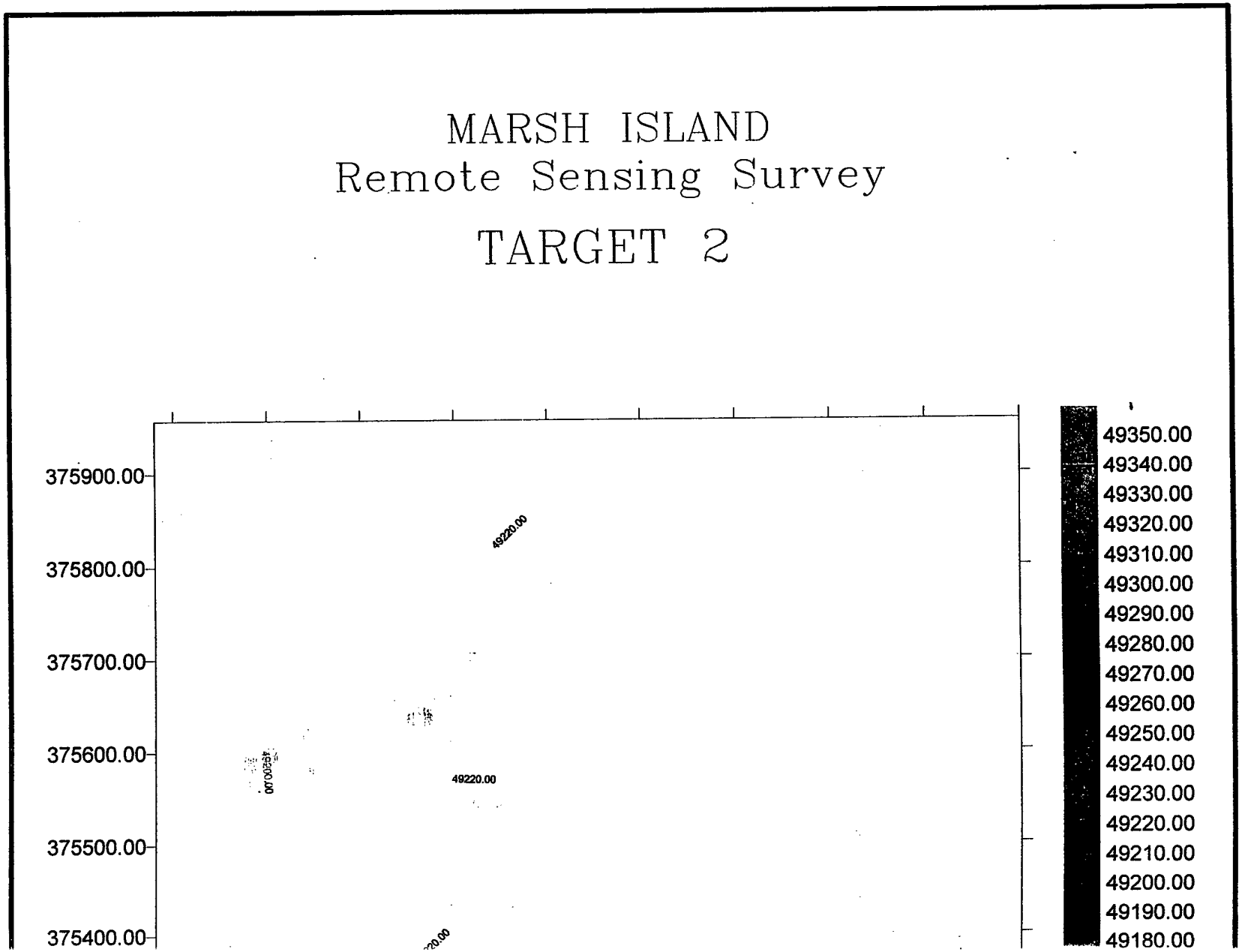
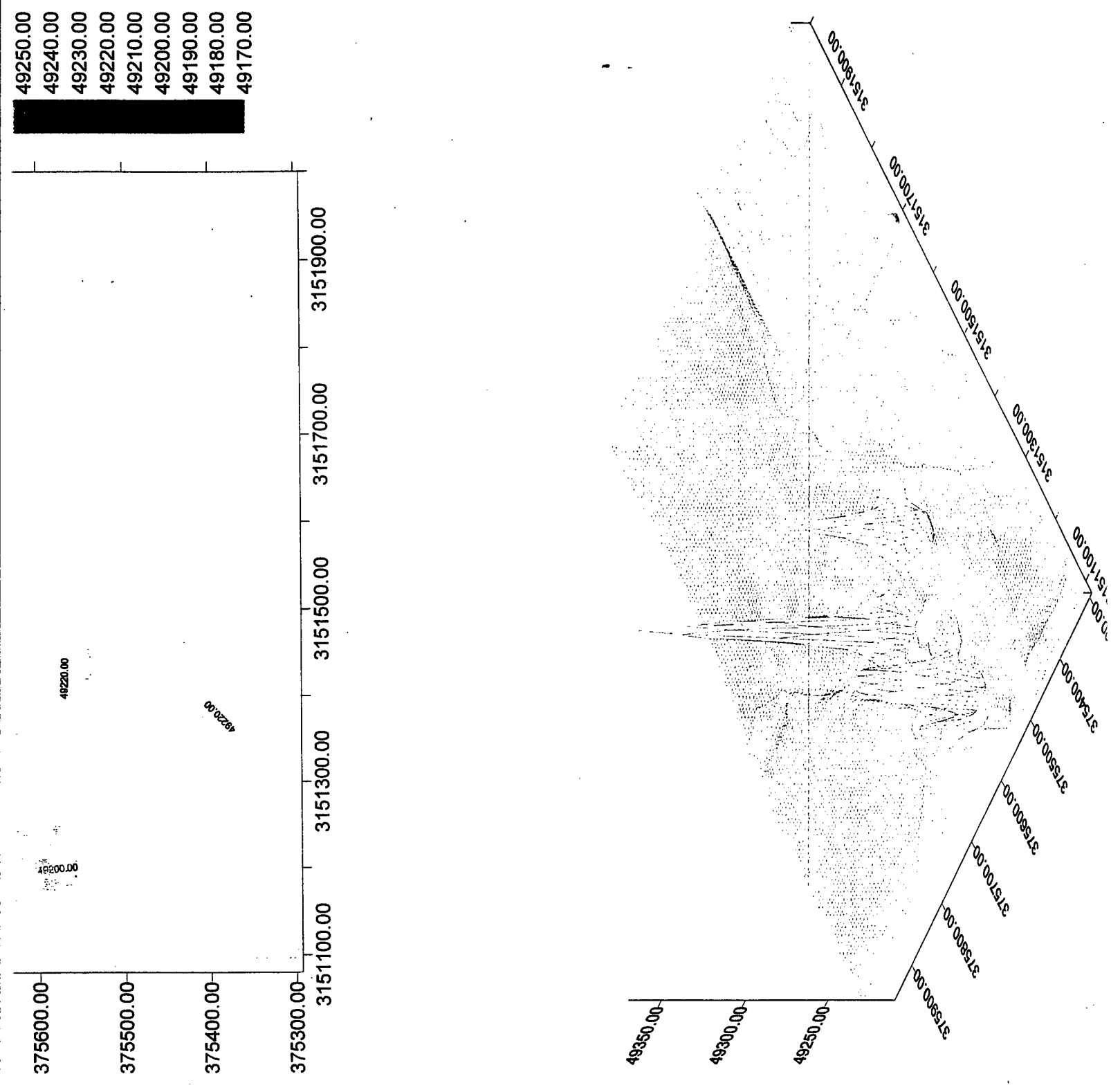


Figure 33. Magnetic contour plot of Target 2.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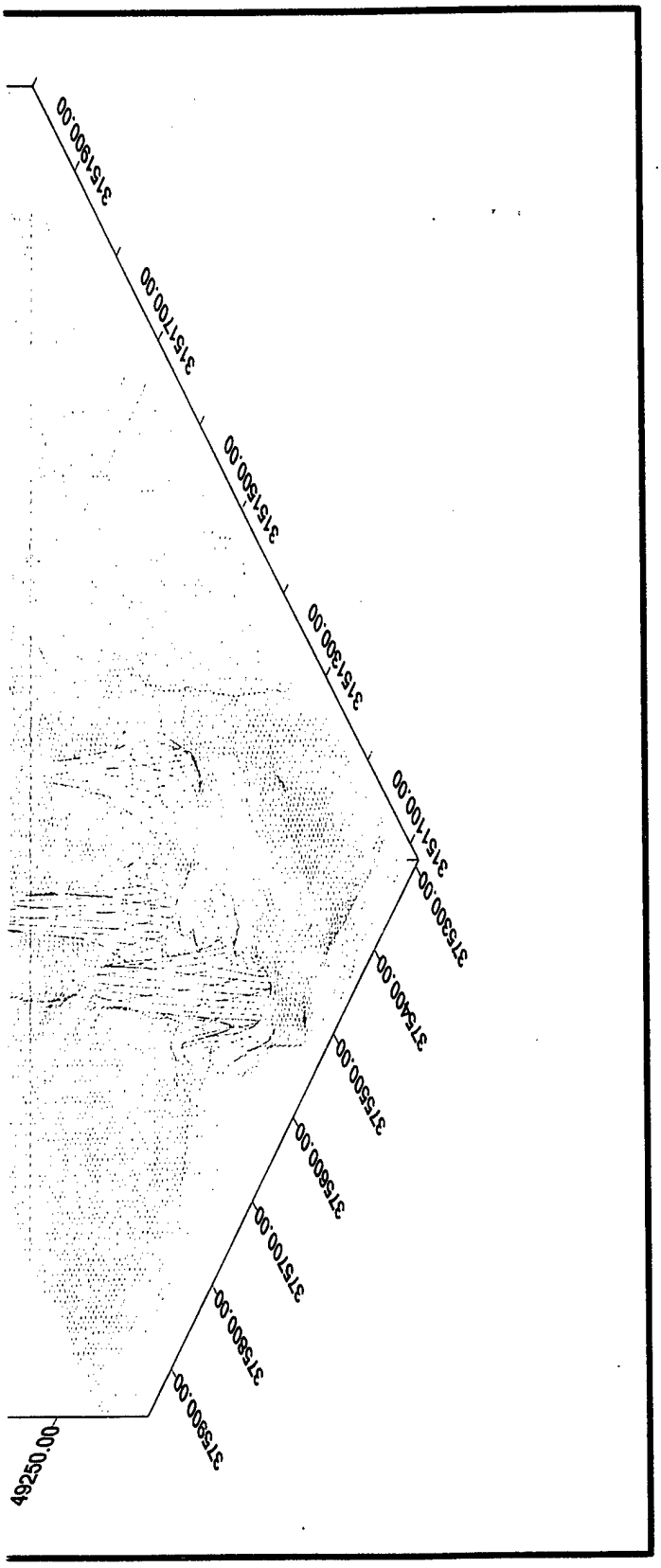
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Target 3

Target 3 consists of two anomalies (M17, M19). M17 is a low amplitude (18.0) positive monopolar magnetic disturbance of long duration (45.0 seconds). M19 is a high amplitude (262.5 gamma) negative monopole anomaly of short duration (6 seconds). Anomalies M17 and M19 lack correlative acoustic anomalies; thus, the identification of the exact source of these magnetic disruptions is nearly impossible. Target 3 (Anomalies M17 and M19) possesses a variety of characteristics that previously have been associated with isolated ferrous debris. Target 3 (Anomalies M17 and M19) does not possess those qualities suggestive of a significant, submerged cultural resource. No additional testing of Target 3 is recommended.

Target 4

Target 4 is composed of four anomalies (M26, M27, M28, M30, and M31) (Figure 34). M26 is a high amplitude (244.5 gammas) dipolar magnetic perturbation of medium duration (14.0 seconds). Both M27 and M28 are high amplitude (112.5 and 124.5 gammas respectively) positive monopolar magnetic perturbations of medium duration (14.0 seconds [M27]) and short duration (4.0 seconds [M28]). M30 is a high amplitude (130.0 gammas) dipolar magnetic perturbation of short duration (5.0 seconds), while anomaly M31 is a high amplitude (789.0 gammas) negative monopolar magnetic perturbation also of short duration (3.0 seconds). Again, the absence of a correlative acoustic anomaly makes it difficult to determine the precise nature of this cluster of anomalies. This target, however, has a moderate potential to represent the remains of a significant submerged cultural resource and further investigation of this target is recommended. Within the cluster, M26 and M27 appear to have the greatest potential to provide significant information, and these anomalies should be evaluated first; this should be followed by examination of anomaly M30. If a submerged cultural resource is identified as a result of that investigation, then the remaining two anomalies should be investigated. If the survey of anomalies M26, M27 and M30 produces only negative results, then no additional examinations of anomalies M28 and M31 is recommended.

Target 5

Target 5 consists of two anomalies (M47 and M48). M47 is a low amplitude (27.5 gammas) negative monopolar magnetic perturbation of short duration (7.0 seconds). Anomaly M48 is medium amplitude (76.5) gamma negative monopole magnetic perturbation of short duration (3.0 seconds). Typically, the remains of shipwrecks yield greater magnetic amplitudes, evidence of polarity swings, and generally extend across several survey transect lines. Target 5, therefore, has little potential to represent the remains of a significant submerged cultural resource. The characteristics of Target 5 are consistent with those of isolated ferrous debris. No additional testing of Target 5 is recommended.

Target 6

Target 6 consists of two anomalies (M39 and M40). M39 is a medium amplitude (78.0 gammas) multi-component magnetic perturbation of short duration (17.0 seconds). M40 is low amplitude (43.5 gammas) dipolar magnetic perturbation of short duration (3.0 seconds). Shipwrecks typically are associated with multi-component magnetic anomalies; however, the short duration and weak magnetic deflection of M39 and M40, coupled with the lack of any associated acoustic anomalies, suggest that M39 and M40 do not represent the remains of a shipwreck. The characteristics of Target 6 are consistent with those of isolated ferrous debris. No additional testing of Target 6 is recommended.

Target 7

Target 7 is composed of three anomalies (M36, M37, and M41). M36 is a medium amplitude (76.5 gammas) multi-component magnetic, perturbation of short duration (5.0 seconds), while M37 is a low amplitude (43.5 gammas) negative monopole magnetic perturbation of short duration (9.0 seconds). M41 is also a low amplitude (21.5) dipolar magnetic perturbation of short duration (6.0 seconds). While shipwrecks typically have multi-component magnetic anomalies, the short duration and weak magnetic deflection of Target 7, coupled with the lack of any associated acoustic signature, suggest that Target 7 consists of only isolated ferrous debris. No additional testing of Target 7 is recommended.

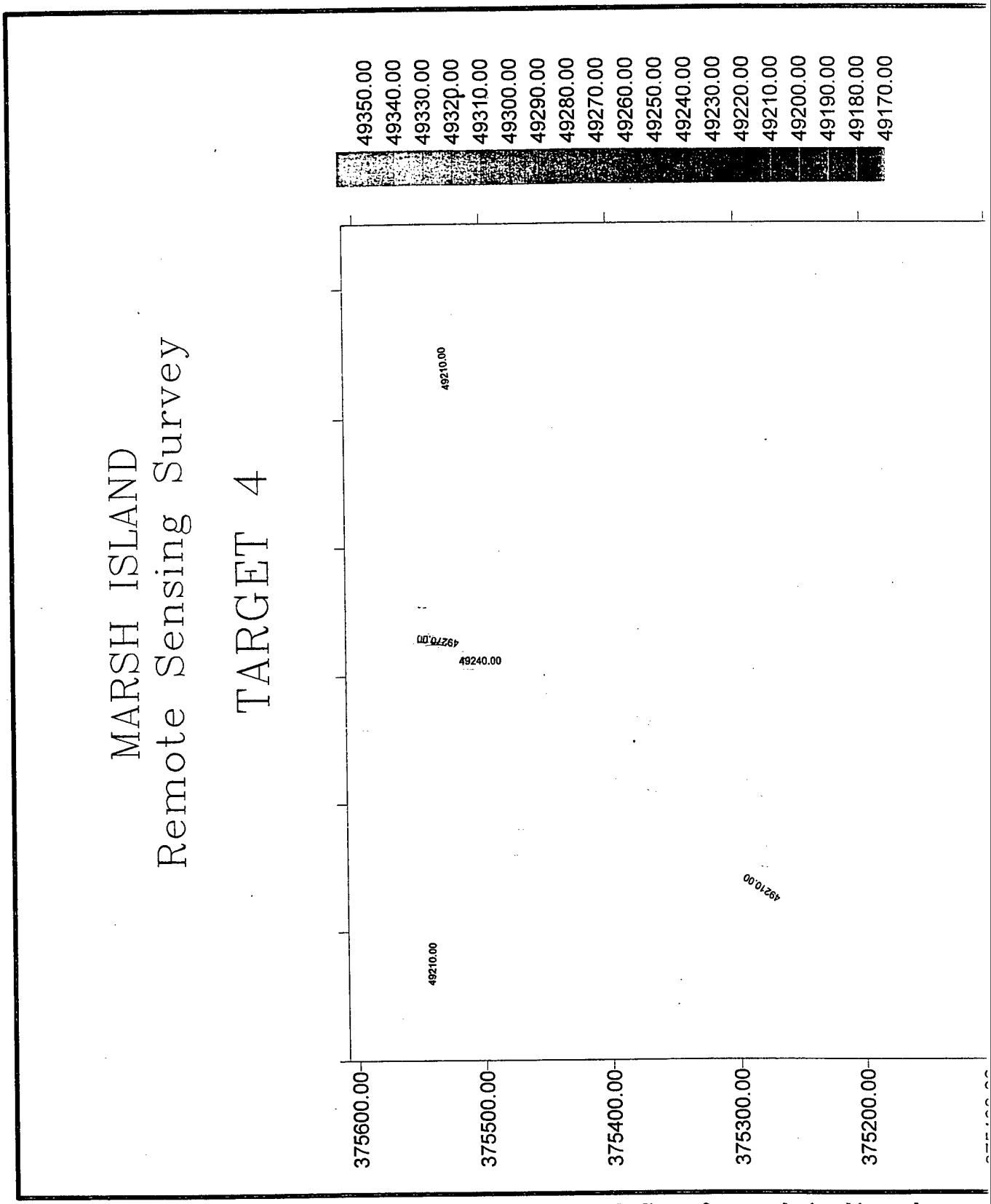
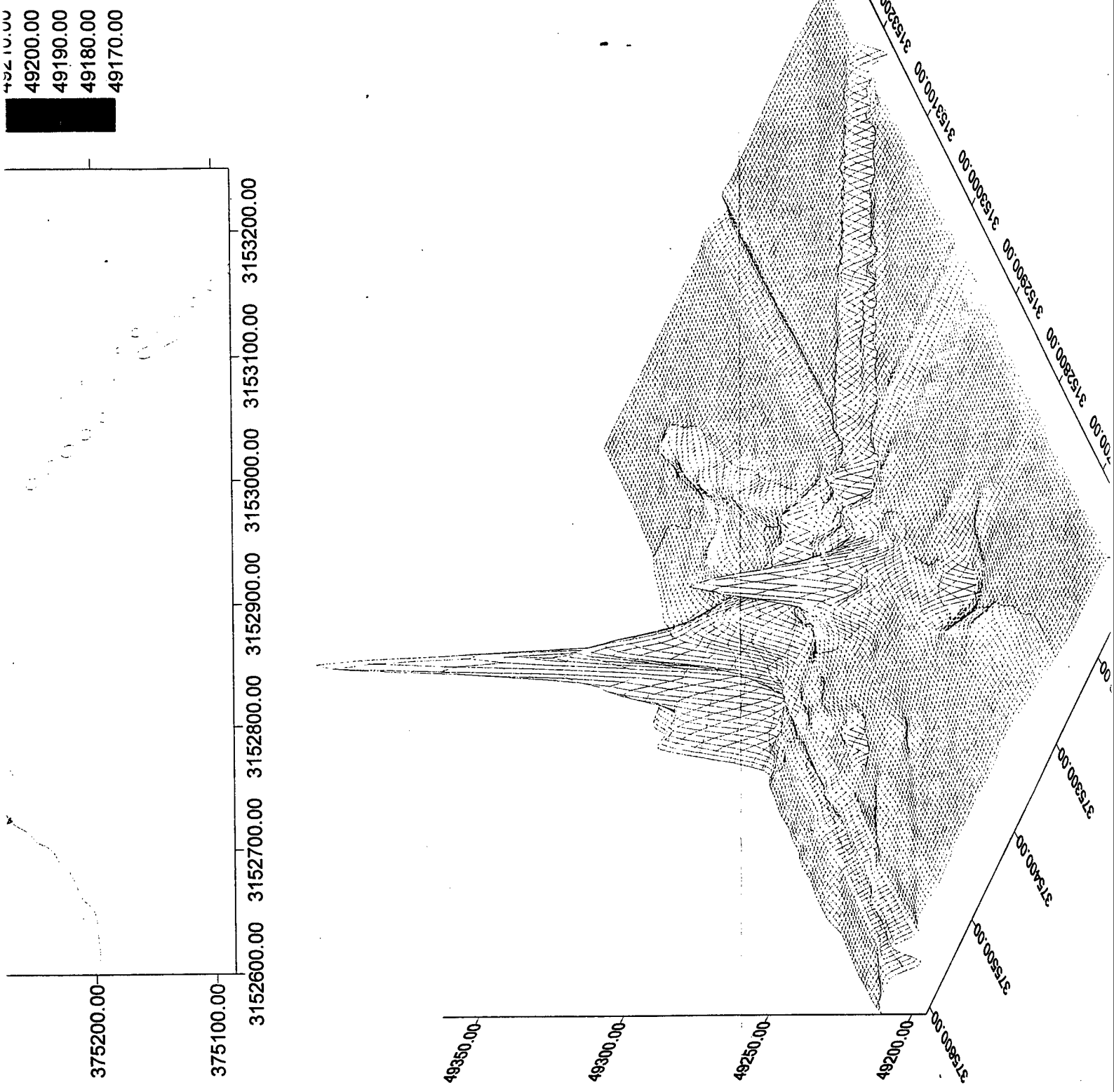


Figure 34. **Magnetic contour plot of Target 4 (please note that the linear features depicted in mesh are a r**



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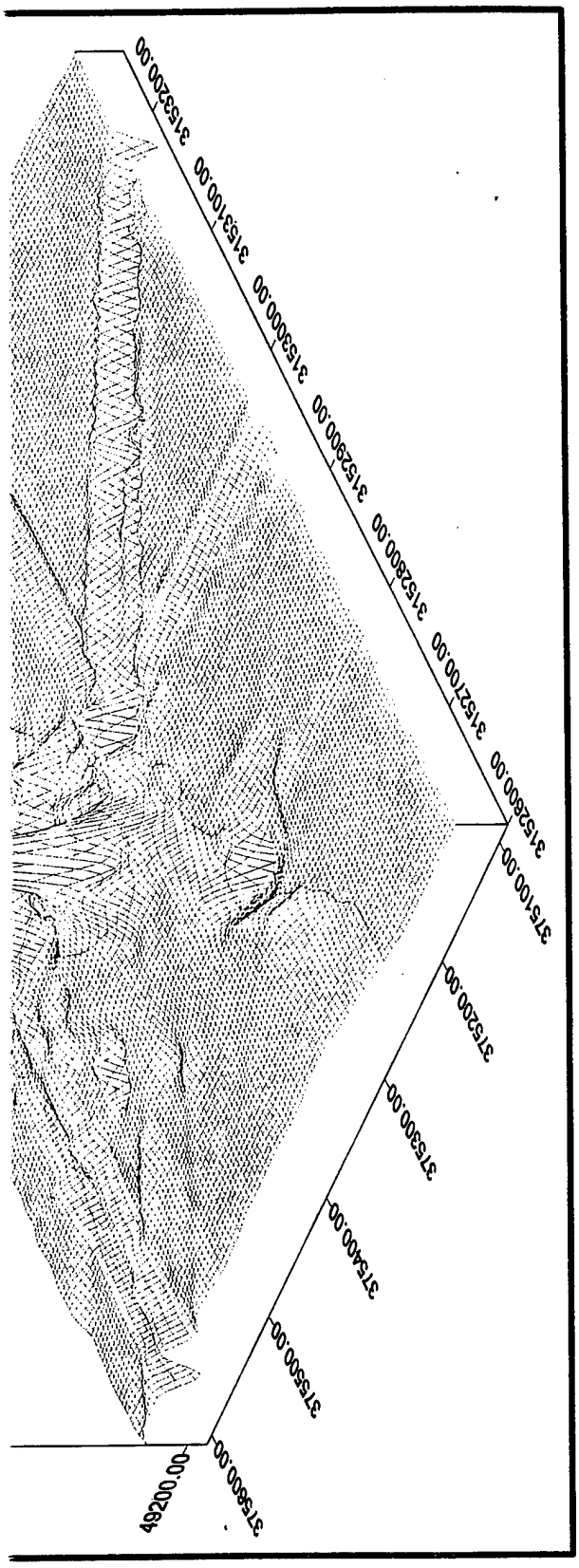
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Target 8

Target 8 contains four magnetic anomalies (M38, M42, M43, and M44). M38, M42, and M43 are low amplitude (37.0, 30.5, and 13.5 gammas) positive monopolar, magnetic perturbations of short duration (3.0, 13.0 and 10.0 seconds). M44 is a low amplitude (22.0 gammas) dipolar magnetic perturbation of short duration (6.0 seconds). The short duration and weak magnetic deflections of the associated magnetic anomalies, as well as the lack of any associated acoustic anomalies, suggest that Target 8 is nothing but isolated ferrous debris. No additional testing of Target 8 is recommended.

Target 9

Target 9 consists of two magnetic anomalies (M60 and M61). M60 is a low amplitude (30.5 gammas) multi-component magnetic perturbation of short duration (7.0 seconds). M61 is a low amplitude (14.5 gammas) dipolar magnetic perturbation of short duration (3.0 seconds). The short duration and weak magnetic deflections associated with these two magnetic anomalies as well as the lack of any discernable acoustic anomalies demonstrate that Target 9 has little potential to represent a submerged cultural resource. No additional testing of this anomaly cluster is recommended.

Target 10

Target 10 consists of three magnetic anomalies (M68, M69, and M71). M68 is a medium amplitude (68.5 gammas) dipolar magnetic perturbation of short duration (4.0 seconds). M69 and M71 are low amplitude (33.5 and 30.0 gammas) dipolar magnetic perturbations of short duration (4.0 and 2.0 seconds, respectively). The short duration and weak magnetic deflections associated with this target, coupled with the lack of any associated acoustic anomalies, strongly suggest that this target does not represent the remains of a significant cultural resource. No additional testing of Target 10 is recommended.

Target 11

Target 11 consists of two magnetic anomalies (M65 and M67) that lie less than 9.15 m (30 ft) apart (Figure 35). Both are high amplitude (222.5 and 123.0 gammas) multi-component magnetic perturbations of medium duration (13.0 and 14.0 seconds, respectively). The relatively high deflection of these anomalies, combined with their moderate duration and the multi-component nature of M67, suggests that the target has a moderate potential for representing the remains of a submerged watercraft. Further evaluation of these two anomalies is recommended.

Target 12

Target 12 consists of two anomalies (M70 and M72). M70 is a high amplitude (410.0) dipolar magnetic disturbance of short duration (4.0 seconds), while M72 is a low amplitude (15.0) positive monopole of medium duration (14.0 seconds). Target 12 lacks correlative acoustic anomalies, making the identification of the exact source of the magnetic disruption impossible. The short duration of Target 12, coupled with the lack of both correlative acoustic anomalies or an association with other magnetic disturbances, indicates that the anomaly cluster lacks the potential to represent a significant submerged cultural resource. No additional testing of Target 12 is recommended.

Target 13

Target 13 contains three magnetic anomalies (M74, M75, and M77) and one acoustic target (A10) associated with magnetic anomaly M74. M74 is a low amplitude (16.5) negative monopolar magnetic anomaly of medium duration (15.0 seconds). A10 is a narrow linear anomaly that crosses the survey swath on both the port and starboard channels. No structures were seen in the acoustic image, but clearly there is a change in sediment reflectivity. M75 consists of a high amplitude (305.5) dipolar magnetic perturbation of medium duration. M77 is a low amplitude (31.0) dipolar magnetic perturbation of medium (13.0 seconds) duration. The acoustic target and the high amplitude dipolar signature associated with Anomaly M74 suggest that the very narrow linear feature liken to a buried pipe or a section of cable. The short duration and low amplitude magnetic anomalies (M75 and M77) associated with M74 suggest, however, that this target does not represent such a feature; rather, they are consistent with a scatter of isolated ferrous debris. No additional testing of Target 13 is required.

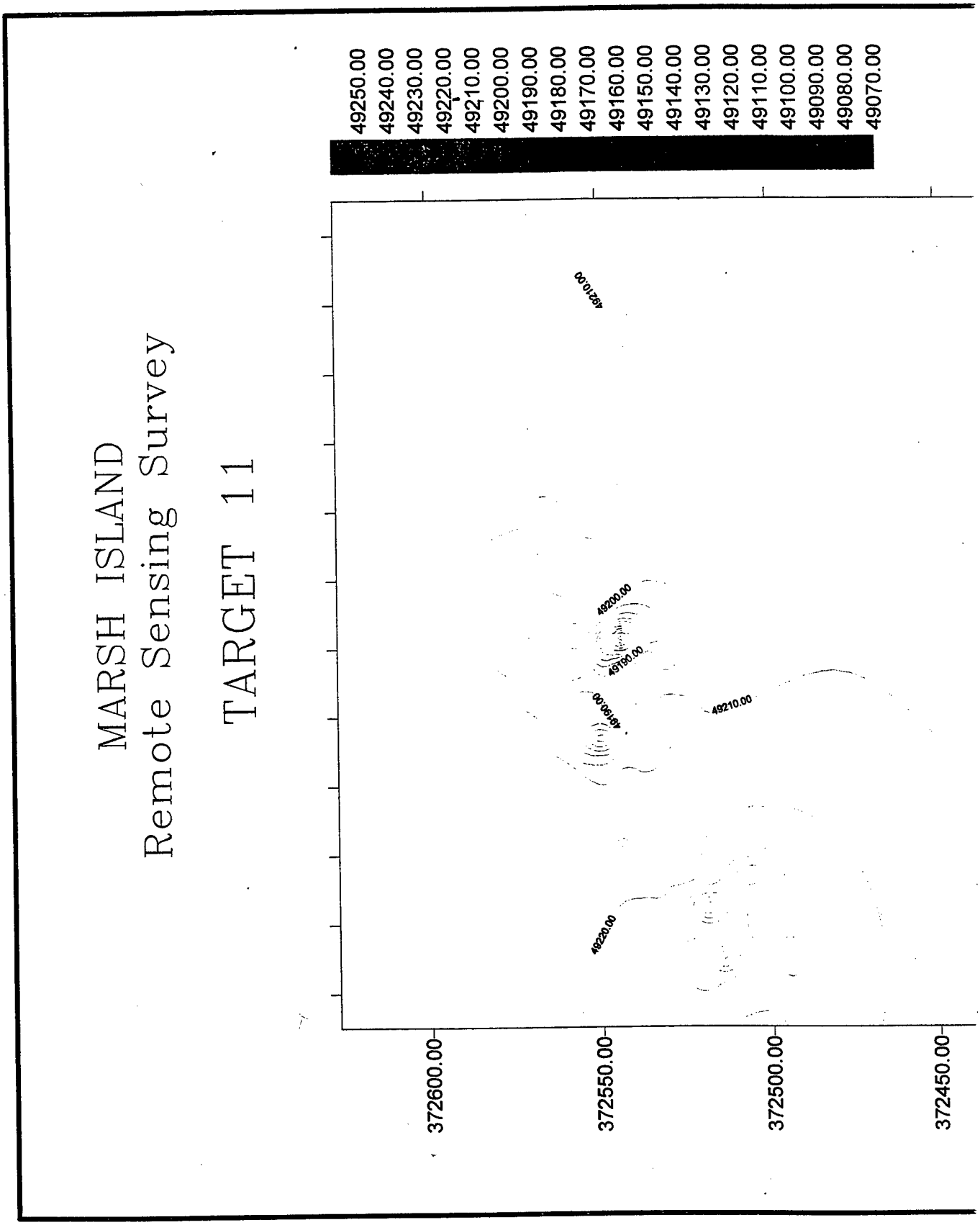

Figure 35. Magnetic contour plot of Target 11.

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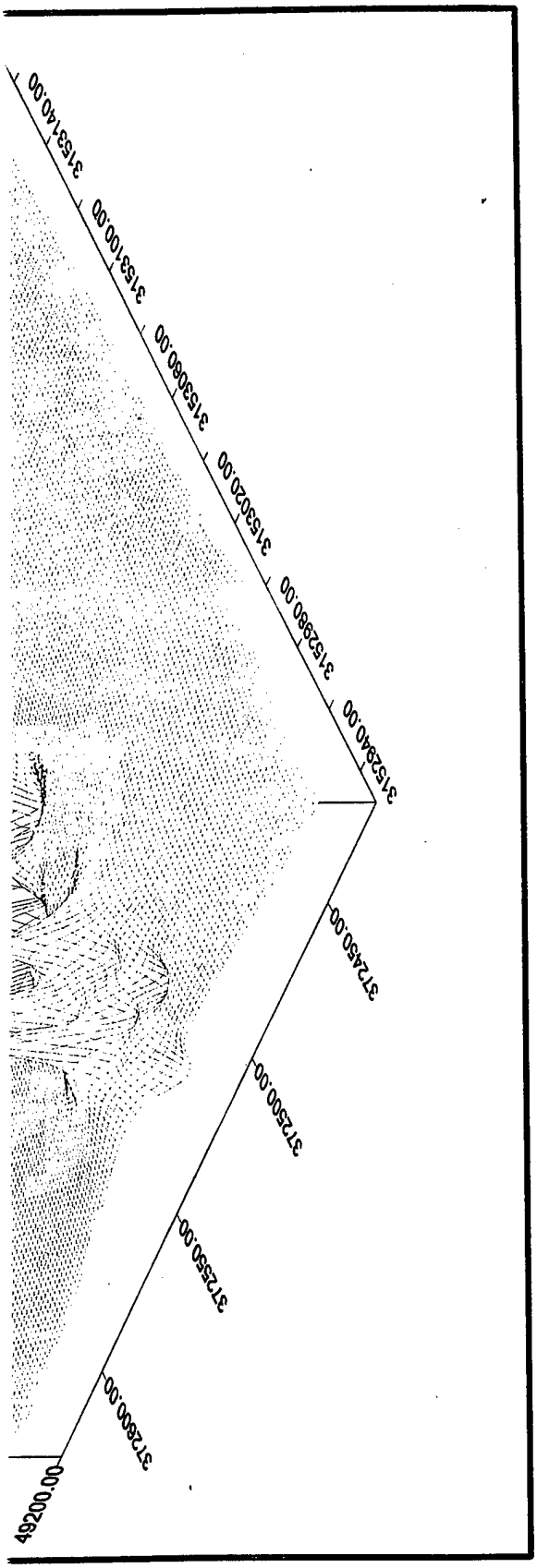
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Target 14

Target 14 includes two magnetic anomalies (M64 and M66). M64 is a low amplitude (47.5 gammas) dipolar disturbance of medium duration (12.0 seconds). M66 is a high amplitude (425.5 gammas) monopolar disturbance of short duration (5.0 seconds). Typically, the remains of a shipwreck yield multi-component anomalies with durations exceeding 30 seconds. It is very unlikely that Target 14 represents anything more than a scattering of ferrous debris. The high amplitude associated with M66 probably represents an instance of the magnetometer sensor passing within close proximity to the source of magnetic disturbance. No further study of Target 14 is recommended.

Target 15

Target 15 consists of a pair of low amplitude, short duration magnetic disturbances (M73 and M76). Anomaly M73 is a 46.0 gamma dipolar disturbance of short duration (6.0 seconds), while magnetic anomaly M76 is a positive monopolar disturbance (32 gammas in strength and nine seconds in duration). The low amplitude and short duration of these anomalies offer little potential for Target 15 to represent the remains of a significant, submerged cultural resource. No additional investigation of Target 15 is recommended.

Target 16

Target 16 is a group of three dipolar (M78, M79, and M84) and one monopolar (M81) magnetic anomalies. Magnetic anomalies M78 and M81 registered low amplitudes (22.5 and 29.0 gammas) and durations of five seconds each. Magnetic anomalies M79 and M84 were of medium amplitude (62.0 and 69.0 gammas) and of short duration (4.0 and 5.0 seconds). The debris field from a shipwreck typically would yield magnetic anomalies of longer duration, and the absence of any corresponding acoustic anomalies, demonstrate that it is unlikely that Target 16 represents the remains of a significant, submerged cultural resource. This target probably represents an isolated scatter of ferrous debris. No additional testing of Target 16 is recommended.

Target 17

Target 17 constitutes a pair of dipolar magnetic anomalies (M82 and M85) of low amplitude (34.0 and 33.5 gammas) and of short duration (3.0 and 6.0 seconds). The size and extent of these magnetic disturbances combined with an absence of correlative acoustic anomalies strongly suggests that Target 17 does not represent a significant cultural resource. No additional testing of Target 17 is warranted.

Target 18

Target 18 consists of a cluster of three positive, monopolar magnetic anomalies (M87, M90, and M91). Anomalies M87 and M91 have amplitudes of 140.0 and 123.0 gammas and exhibit durations of 11 seconds (medium) and three seconds (short), respectively. Anomaly M90 is a monopolar disturbance of low amplitude (38.0 gammas) and of medium duration (14.0 seconds). The short and medium durations of the magnetic data suggests that Target 18 has very little potential to represent the remains of a significant, submerged cultural resource. No additional study of Target 18 is recommended.

Target 19

Target 19 constitutes a pair of monopolar magnetic anomalies (M96 and M97). Magnetic anomaly M96 is a negative, low amplitude (18.5 gammas) disturbance of medium duration (15.0 seconds), while magnetic anomaly M97 is a positive, high amplitude (884.5 gammas) disturbance of short duration (5.0 seconds). The high amplitude return of M97 possibly is the result of the magnetometer sensor passing directly over or very close to the source of magnetic disturbance. An examination of the associated signature suggests that Target 19 does not represent the remains of a significant, submerged cultural resource. No additional testing of Target 19 is recommended.

Target 20

Target 20 consists of a pair of magnetic anomalies (M98, M100) with no corresponding acoustic returns. Magnetic anomaly M98 is a low amplitude (38.0 gammas) monopolar disturbance

of medium duration (18.0 seconds), while M100 is characterized by a monopolar signature of high amplitude (583.0 gammas) and short duration (6.0 seconds). The duration of these magnetic anomalies suggests that they represent small, isolated, ferrous debris and not the remains of a significant, submerged cultural resource. A close pass of the magnetometer sensor to the source of the magnetic disturbance likely caused the high amplitude associated with anomaly M100. For these reasons, no additional testing of Target 20 is recommended.

Target 21

Target 21 consists of five magnetic anomalies (M110, M114, M115, M118, and M119) and one acoustic anomaly (A23). Magnetic anomaly M110 is a negative, monopolar disturbance of low amplitude (11.0 gammas) and medium duration (11.0 seconds), while magnetic anomalies M114, M115, and M119 are dipolar disturbances of low amplitude (17.0, 27.0, and 25.5 gammas) and of short duration (6.0, 7.0, and 3.0 seconds, respectively). The signature of magnetic anomaly M118 characterizes it as a multicomponent disturbance of low amplitude (25.0 gammas) and short duration (9.0 seconds). Associated with magnetic anomaly M115 is an amorphous, linear area of acoustic disturbance (A23). Considering the characteristics of this anomaly and the size and extent of the accompanying magnetic anomalies, Target 21 has a very low potential for representing the remains of a submerged cultural resource. The data collected from these anomalies, together with their location, suggest that this target likely represents a pipeline or cable or perhaps related debris. No additional testing of Target 21 is recommended.

Target 22

Target 22 comprises 31 magnetic anomalies (M94, M99, M101, M102, M104, M105, M106, M107, M108, M111, M113, M116, M117, M121, M120, M123, M122, M126, M131, M128, M133, M135, M137, M138, M142, M140, M143, M144, M139, M145, M148) and 8 corresponding acoustic anomalies (A11, A12, A14, A21, A24, A28, A30, A36). The magnetic anomalies range in amplitude from a low of 41.5 gammas (M139) to a high of 1934.0 gammas (M113). A similar range is exhibited in duration, ranging from nine seconds (M123) to 90 seconds (M101). Of the 31 magnetic anomalies contained within this cluster, 20 exhibit multi-component signatures (M94, M99, M101, M102, M104, M106, M117, M120, M121, M126, M128, M131, M133, M135, M137, M142, M143, M144, M145, M148); the remaining 11 exhibit dipolar signatures (M105, M107, M108, M111, M113, M116, M122, M123, M138, M139, M140). Given the characteristics of these magnetic anomalies, specifically the number of high amplitudes (29 of 31), the number of medium to long duration (30 of 31), and the number of anomalies displaying multi-component signatures (20 of 31), there is a high probability that Target 22 represents an entity of considerable size and ferrous content, most likely a pipeline or large diameter cable. The spatial distribution of the magnetic and acoustic anomalies comprising this target supports this conclusion. The anomalies form a narrow, linear pattern that runs along the seaward edge of the survey area and in a southeast to northwest direction. Additionally, all of the acoustic anomalies correlated with this target can be described as narrow and linear, and they either crossed the entire sonar survey swath or else occupied considerable portions thereof. No additional testing of the Target 22 anomaly cluster consequently is recommended.

Target 23

Target 23 includes three magnetic anomalies (M124, M125, and M130). Magnetic anomaly M124 is a low amplitude (29.5 gammas) dipolar magnetic perturbation of short duration (5.0 seconds). Magnetic anomaly M125 is a low amplitude (36 gammas) negative monopolar magnetic disturbance of short (5.0 seconds) duration, while M130 is a multi-component disturbance of low amplitude (36.0 gammas) and medium duration (19.0 seconds). The size and extent of these three magnetic anomalies (M124, M125, and M130) suggest that Target 23 represents a scattering of debris and therefore does not have the potential to represent the remains of a significant submerged cultural resource. No additional testing of Target 23 is recommended.

Target 24

Target 24 includes a pair of positive monopolar magnetic anomalies (M127 and M132). M127 is a disturbance of both medium amplitude

(51.0 gammas) and medium duration (13.0 seconds). M132 represents a magnetic disturbance of low amplitude (16.5 gammas) and medium duration (17.0 seconds). The relatively low amplitude and short duration of these two anomalies and the lack of correlative acoustic imaging indicate that Target 24 lacks substantive research potential. The target probably represents a pipeline or cable that crosses through Survey Area 1. No additional testing of Target 24 is recommended.

Target 25

Target 25 contains a magnetic anomaly (M109) and a corresponding acoustic anomaly (A19). Magnetic anomaly M109 is a medium amplitude (100 gammas) positive monopolar disturbance of medium duration (11.0 seconds). Acoustic anomaly A19 is a linear area of bottom surface disturbance. The monopolar signature, medium amplitude, and short duration of Target 25 suggest that this anomaly has little potential to represent a significant submerged cultural resource. The acoustic data (Anomaly A19) indicates that this target may be a segment of pipe or cable associated with Target 22. No additional testing of Target 25 is warranted.

Target 26

Target 26 is located along the shoreline and near the southern end of Hawkins Bayou; it contains two magnetic anomalies (M149, M155) and a corresponding acoustic anomaly (A39) (Figure 36). Magnetic anomaly M149 is a low amplitude (26.0 gammas) positive monopolar disturbance of medium duration (21.0 seconds). Magnetic anomaly M155 is a medium amplitude (50.5 gammas) dipolar disturbance of short duration (6.0 seconds). Acoustic anomaly A39 consists of a three small, cylindrical acoustic disturbances that extended from the shore into the water for a distance of approximately 0.61 to 0.91 m (2 to 3 ft) (Figure 37). A visual inspection of the bankline identified the existence of three small pilings that corresponded to the spatial distribution and characteristics of both the acoustic and magnetic anomalies. This area was further investigated during the terrestrial portion of the cultural resources surveys and it was designated Locus 1. This locus is discussed in greater detail in a subsequent section of this chapter. Locus 1 was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Consequently, no additional testing of Target 26 is recommended.

Target 27

Target 27 consists of one (M156) very high amplitude (27,225.5 gammas) dipolar magnetic anomaly of short (6.0 seconds) duration. The extremely high gamma reading and short duration of the event is due to the water depth beneath the magnetic tow sensor (Figure 38). The fathometer reports 0.35 m (1.1 ft) of water beneath the sensor, making any ferrous debris that it passes over deflect the earth's magnetic field on a massive scale. The short duration is indicative of a small ferrous target position in very close proximity to the magnetic sensor. Target 27 probably consists of ferrous debris that eroded out of the bank, or once was associated with the structures that were located in this area, or perhaps it was associated with the dredging of the canal during the 1970s. No additional testing of Target 27 is recommended.

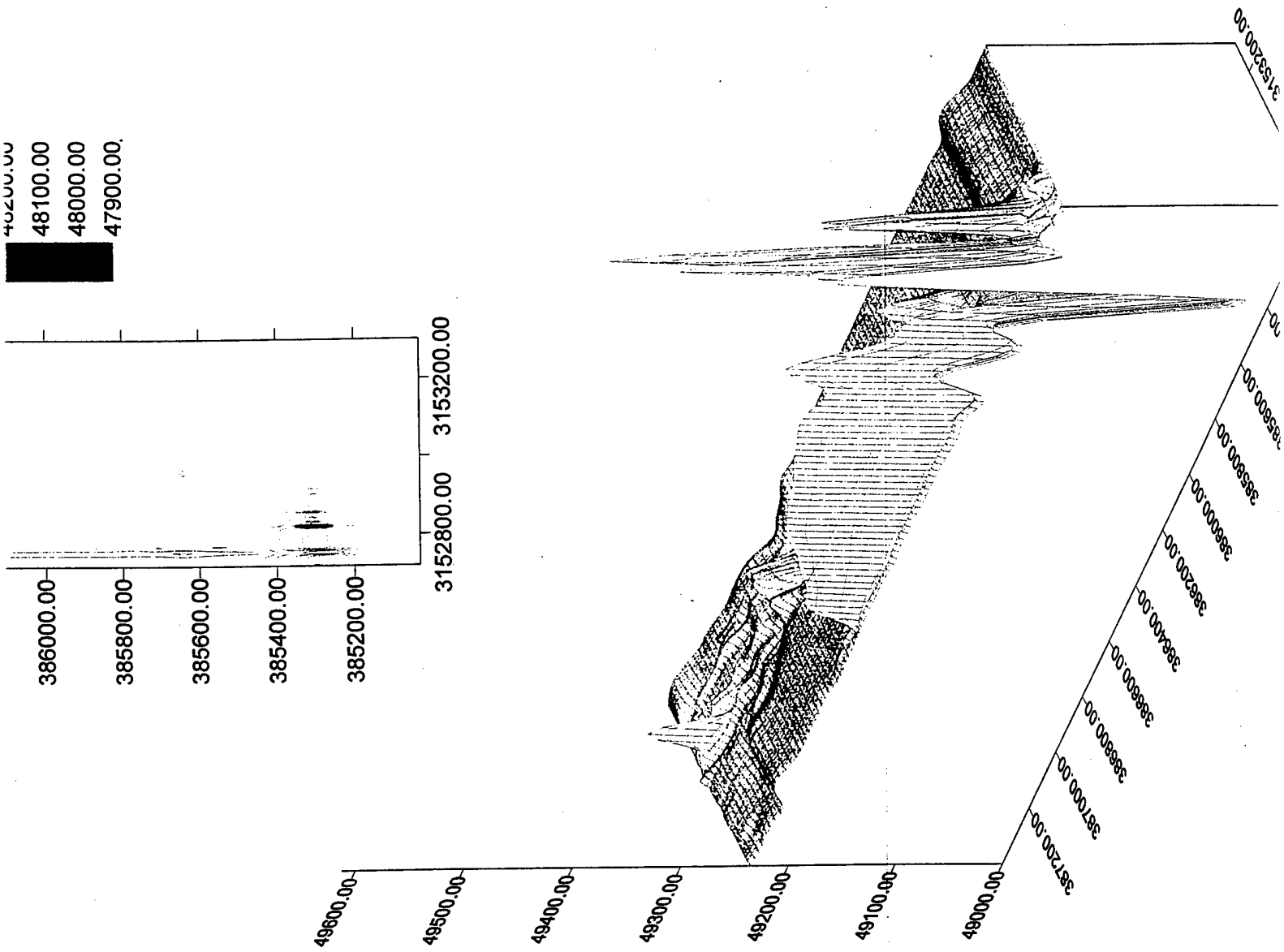
Results and Data Analysis – Terrestrial Survey

The results of the Phase I cultural resources survey and archeological inventory of the Shoreline Protection project item, the Sand Lake Closure project item, the nine canal closures, and the Hawkins Bayou investigations are presented below. An assessment of the potential for each area to produce significant prehistoric and historic period cultural resources appears in Chapter V, and as noted above, the project area has been utilized heavily by the fishing, trapping, and petroleum exploration industries throughout the twentieth century. Each project item is discussed below.

Shoreline Protection Project Item

The proposed Shoreline Protection project item consists of a marsh beach spanning an area measuring approximately 610 m (2,000 ft) in length; it is situated along the north shore of Marsh Island between Hawkins Bayou and Lake Point (Figure 2, Sheet 2). This project item lies in an area of low elevation (< 50 cm [< 19.7 in] amsl) subject to frequent flooding and it is dominated by marsh grass (Figure 39). During the Phase I cultural resources survey of this project

Figure 36. **Map of the Hawkins Bayou underwater survey area depicting the magnetic contouring of th**



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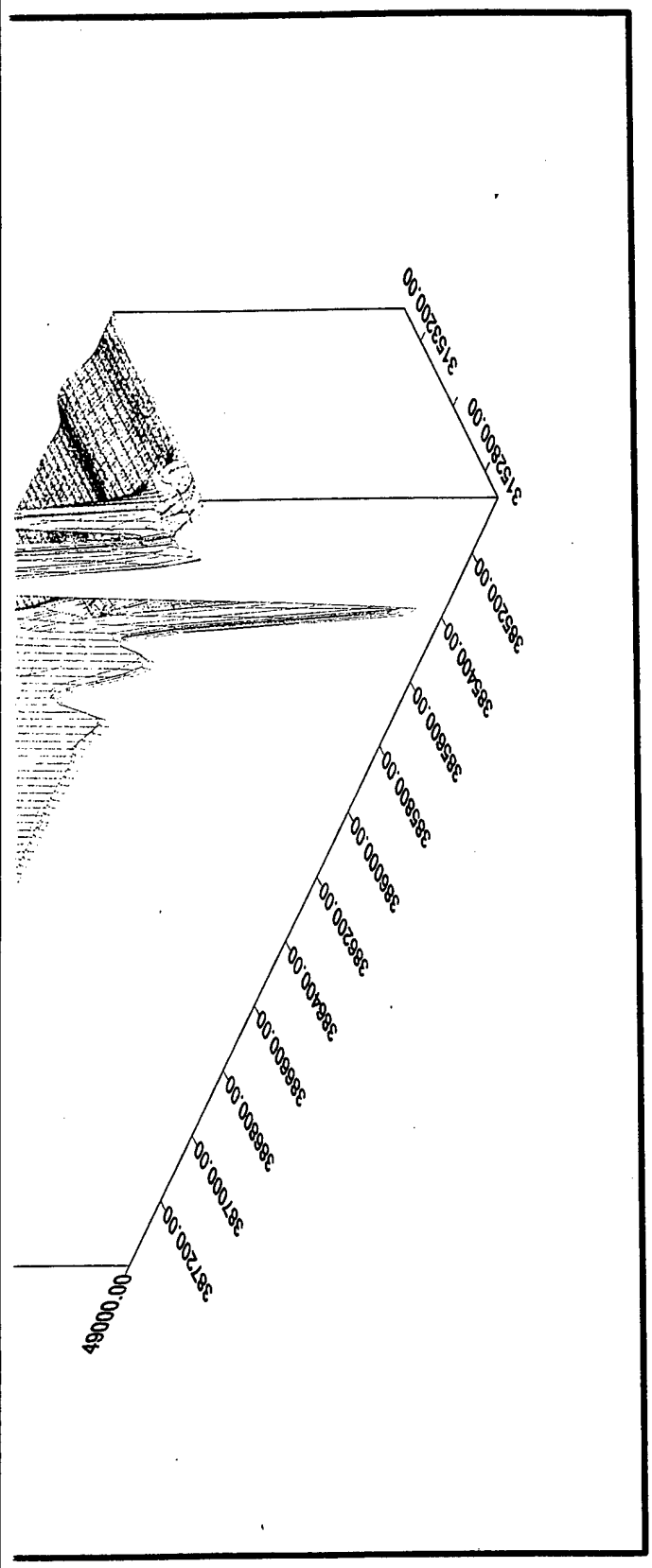
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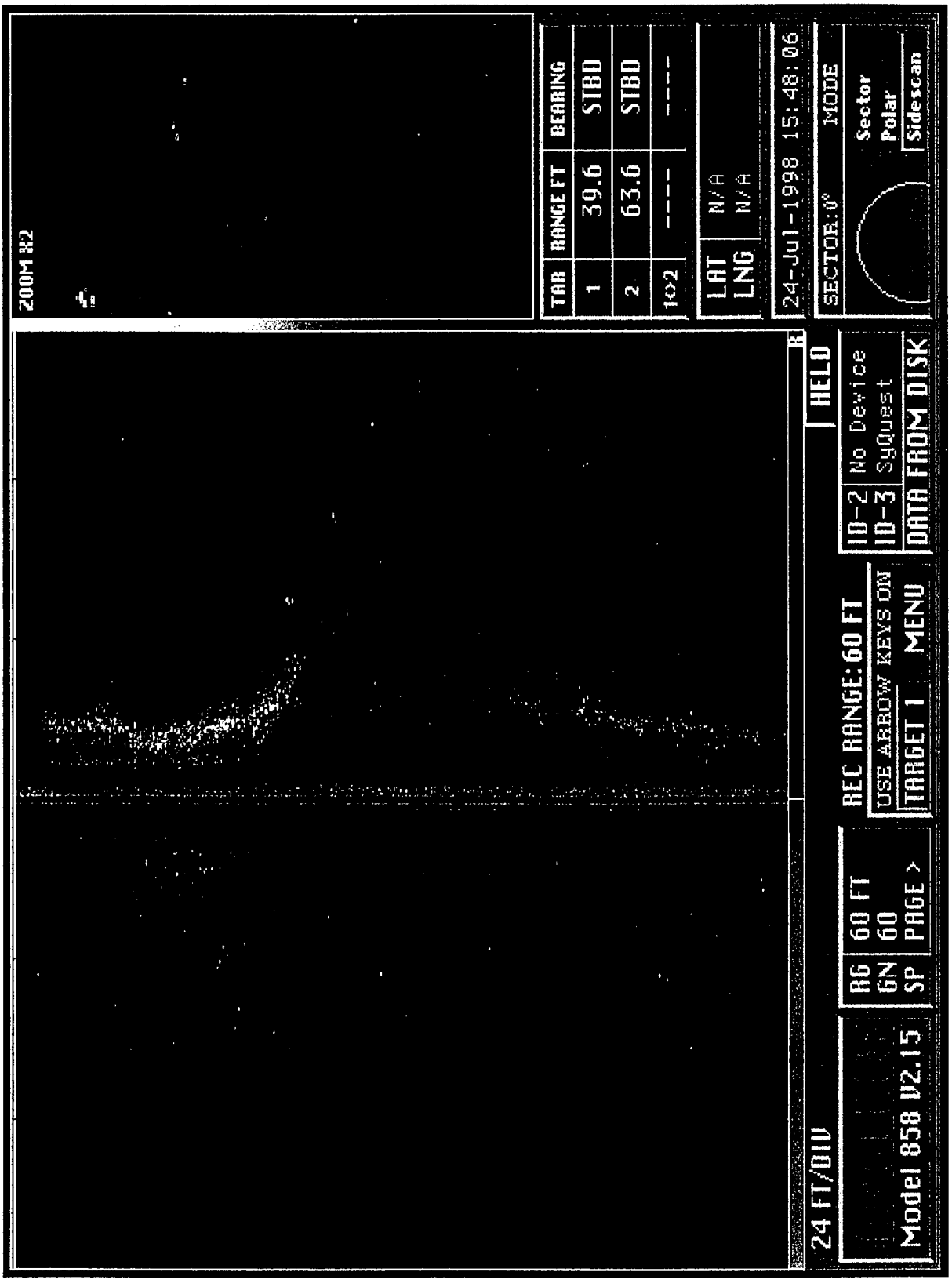

Figure 37. Side scan sonar image of the pilings associated with a possible dock structure within Hawkins Bayou.

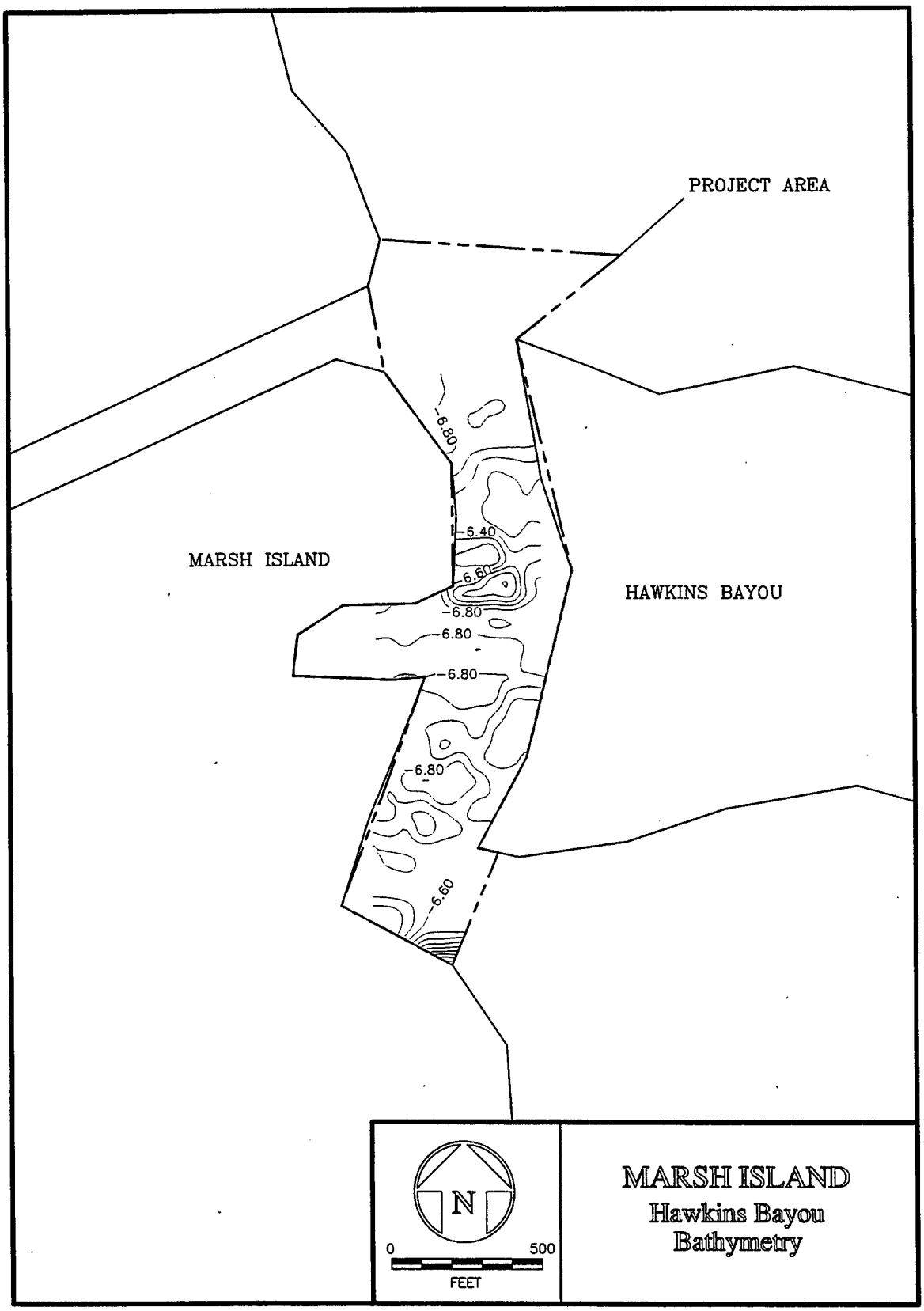

Figure 38. Map of the Hawkins Bayou underwater survey area depicting bathymetric contouring of the surveyed area.

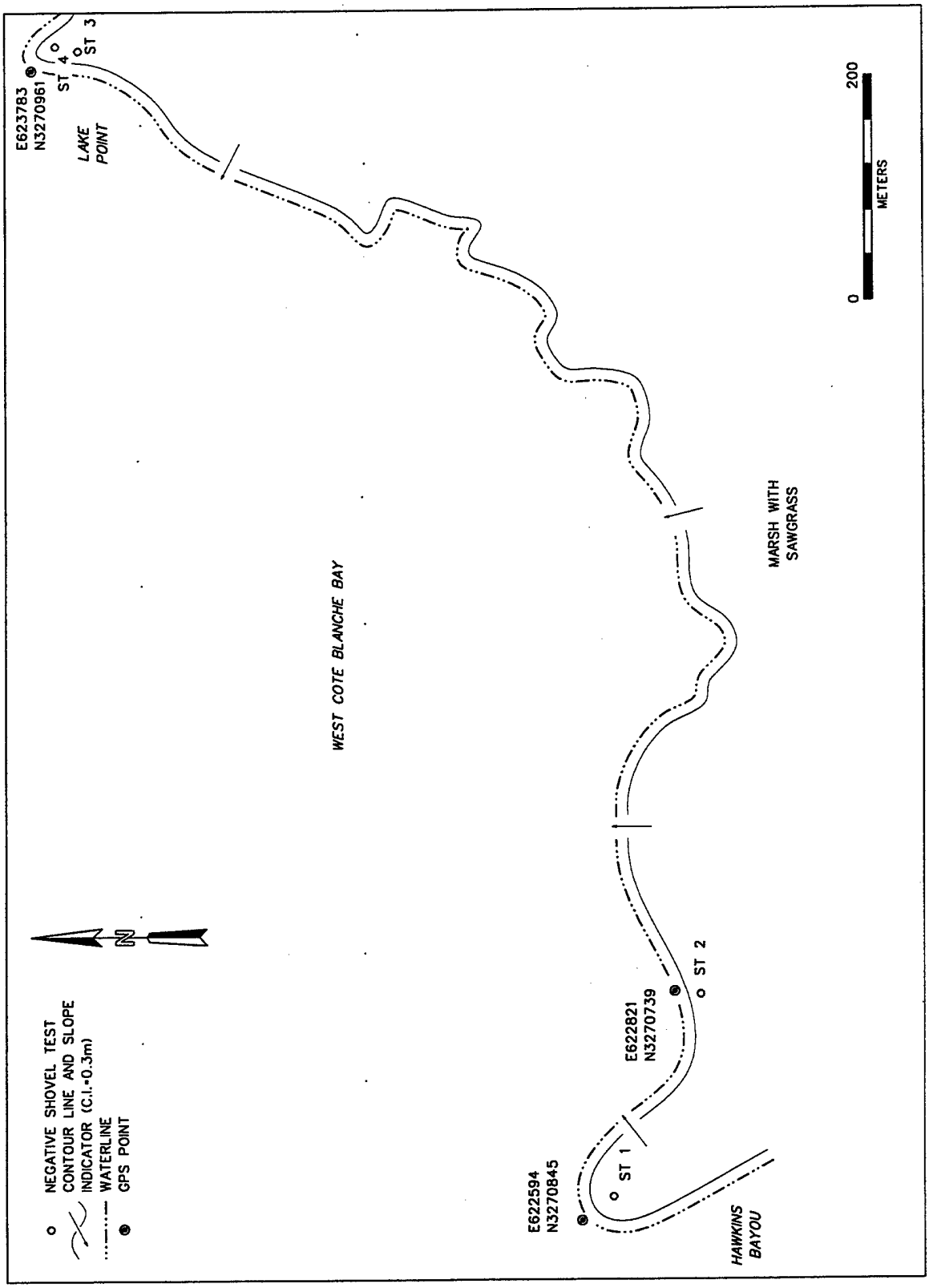

Figure 39. Site map of the Shoreline Protection project area.

item, most of the area either was submerged or water was encountered in close proximity to the ground surface.

Phase I assessment of the project item consisted of a visual examination of the exposed beach line and pedestrian survey and shovel testing along one transect oriented parallel to West Cote Blanche Bay; the survey transect was situated approximately 20 m (65 ft) inland from the existing shoreline.

Each judgmentally placed shovel test was excavated to an approximate depth of 30 cmbs (11.8 inbs). During survey, only one soil stratum was recorded. It was characterized as a layer of dark brown (10YR 4/3) humic material or muck. Subsurface water was encountered in each of the shovel tests at a depth of approximately 10 cmbs (3.9 inbs). No evidence of intact cultural deposits or cultural materials was observed/collected. No additional testing of the proposed Marsh Island Shoreline Protection project item is recommended.

Sand Lake Closure Project Item

The proposed Sand Lake Closure project item is situated on the north shore of Marsh Island at a natural breach in the shore line; the breach measures approximately 250 m (820 ft) in width (Figure 2, Sheet 2). Terrestrial survey of this project item was conducted to the east and to the west of the breach (Figure 40). The project item is characterized by low elevation (< 50 cm [< 19.7 in] amsl), frequent flooding due to tidal fluctuations, and by marsh grass vegetation. During the Phase I cultural resources survey and archeological inventory, most of the Sand Lake Closure project item either was submerged or water was encountered in close proximity to the ground surface.

Fieldwork in this item included visual reconnaissance along the beach line and pedestrian survey and shovel testing along a single transect situated approximately 20 m (65 ft) inland from the shoreline. During survey, three judgmentally placed shovel tests were excavated along this transect to depths extending to approximately 20 cmbs (7.9 inbs).

A typical survey shovel test displayed only one stratum in profile. This stratum was characterized as a layer of dark brown (10YR 4/3) humic material or muck. During excavation water was encountered at a depth of 8 cmbs (3.2 cmbs). No evidence of intact cultural deposits or cultural material was observed/recovered as a result of this investigation. No additional testing of the proposed Sand Lake Closure project item consequently is recommended.

Canal 1

Canal 1 is located on the north shore of Marsh Island and it is oriented in an east-west direction (Figure 2, Sheet 1). The canal, which is rapidly silting in, measures approximately 30 m (98 ft) wide across its mouth. Dredged material is located throughout this area and it extends approximately 20 m (66 ft) to either side of the canal bankline; the dredge spoil is now surrounded by marsh. Vegetation in this project item ranges from small shrubs interspersed with willow trees to isolated stands of bamboo. Elevations within this area are approximately 0.76 m (2.5 ft) amsl.

During this Phase I cultural resources assessment, a visual examination was made of the two banklines. In addition, two shovel tests were excavated at the mouth of the canal (Figure 41). No cultural material or evidence of intact cultural deposits were identified as a result of this investigation. Shovel Test 1 was located on the north bank, approximately 15 m (49 ft) from the mouth of the canal. The shovel test extended to a depth of approximately 45 cmbs (13.7 inbs) at which point water impeded the excavation. Shovel Test 2 was excavated along the south bank of the canal, approximately 15 m (49 ft) from its mouth. Shovel Test 2 was excavated to a depth of 45 cmbs (17.7 inbs), and again, an inflow of water hampered the excavation of this exploratory shovel test.

Both shovel tests excavated in the Canal 1 area exhibited two strata in profile (Figure 42). Stratum I was characterized as a layer of very dark grayish brown (10YR 4/3) loamy clay that extended to a depth of approximately 20 cmbs (7.9 inbs). Stratum II consisted of a layer of gray (10YR 5/1) clay that extended to approximately 45 cmbs (13.7 inbs). No evidence of intact cultural deposits or cultural material was observed/recovered as a result of this investigation. No additional testing of Canal 1 is recommended.

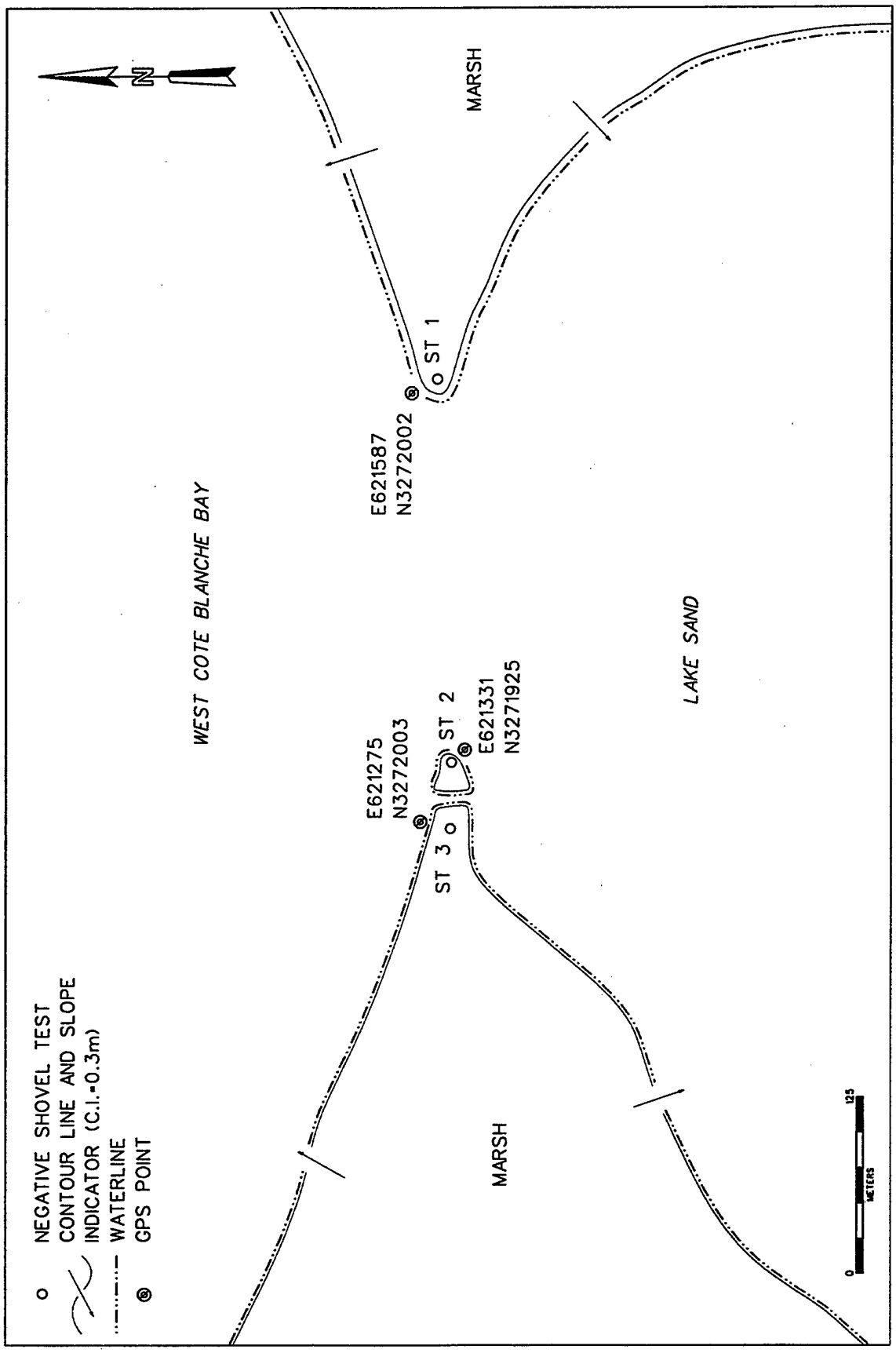

Figure 40. Site map of the Lake Sand Cell Closure project area.

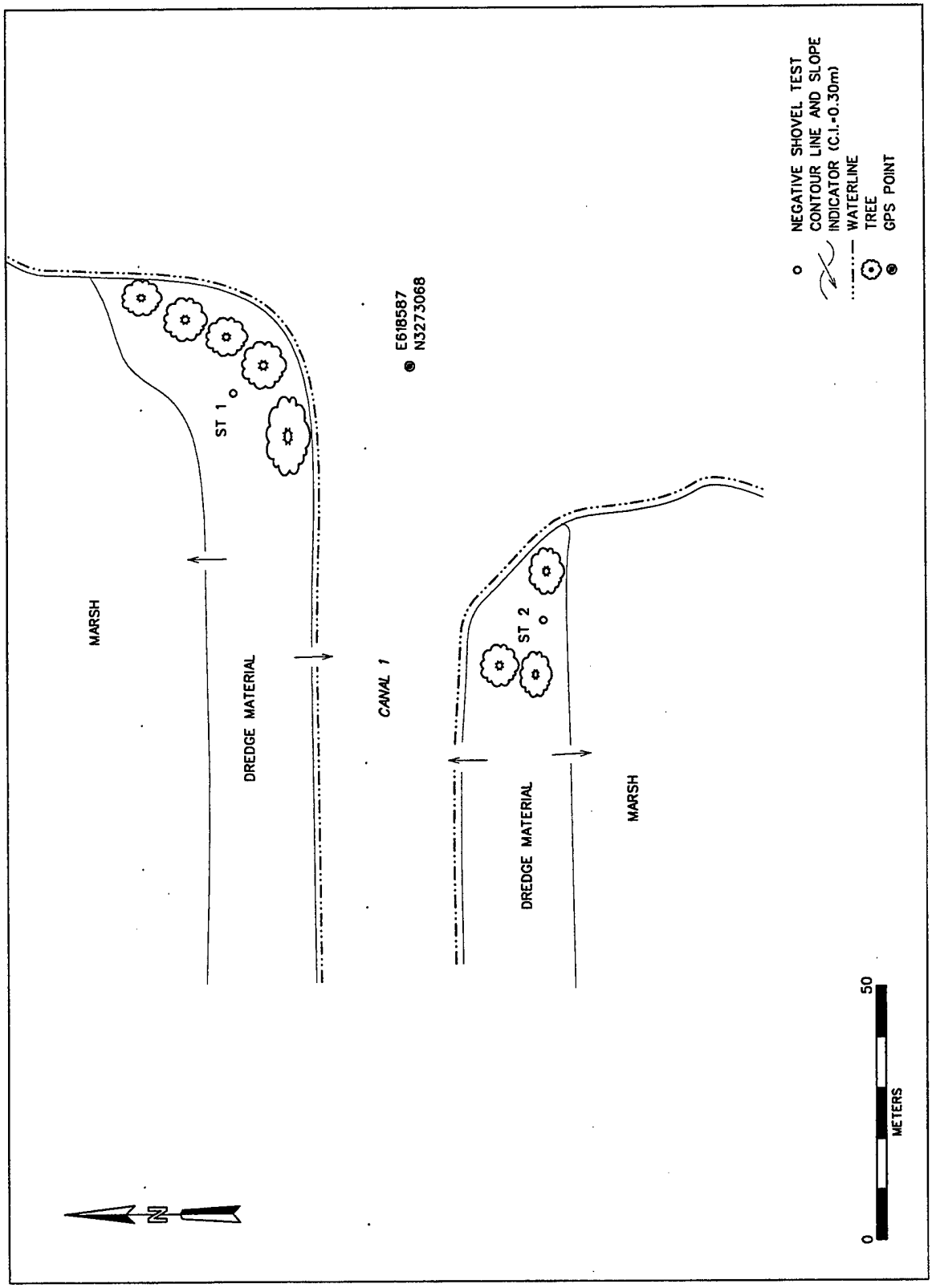

Figure 41. Site map of Canal 1 project area.

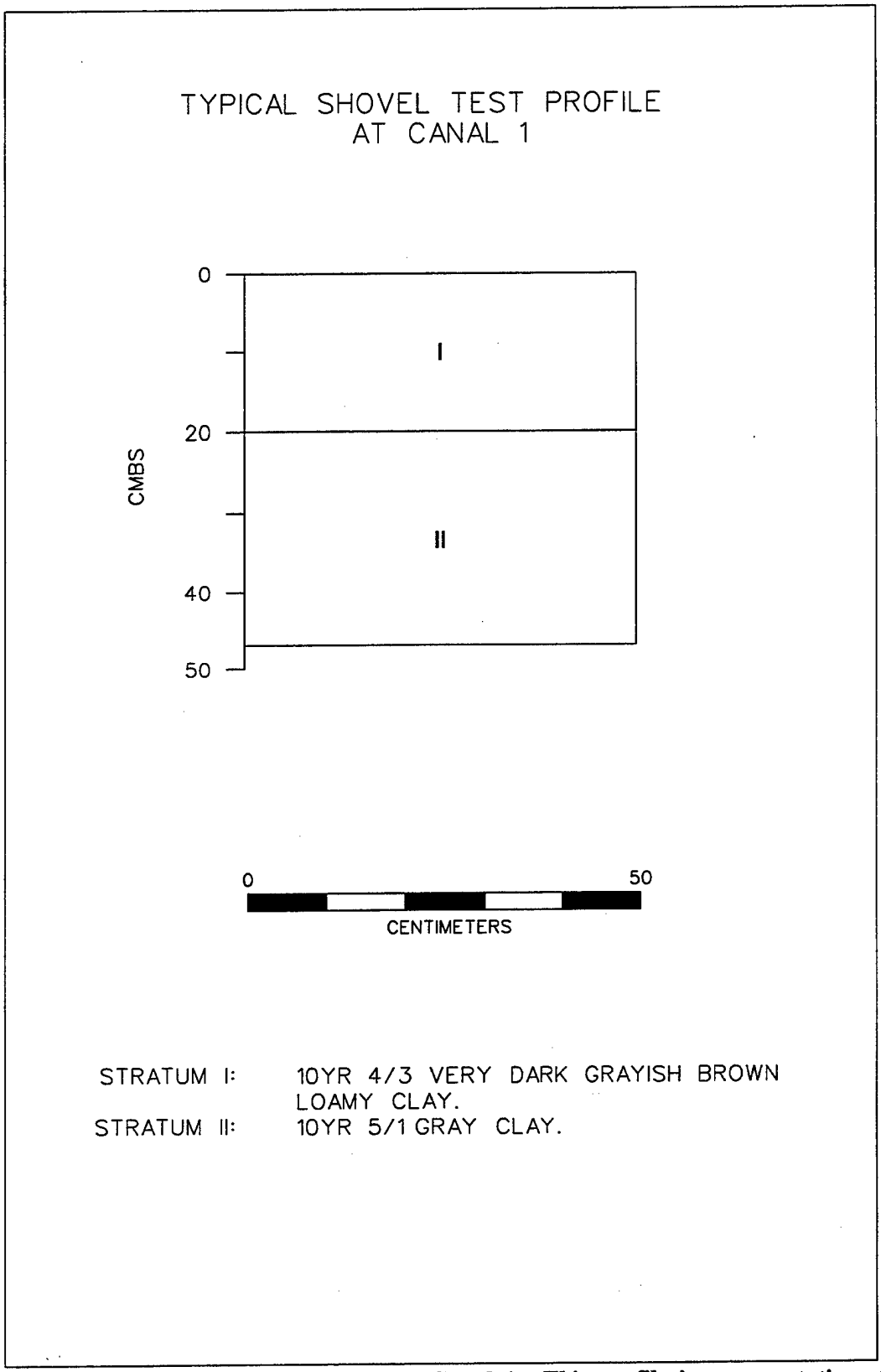

Figure 42. **A typical shovel test excavated at Canal 1. This profile is representative of most shovel tests excavated as part of the Marsh Island restoration project.**

Canal 2

Canal 2 is located on the north shore of Marsh Island and it is oriented in an east-west direction (Figure 2, Sheet 1). The canal originally was excavated to a depth of about 2.5 m (8 ft), and it currently measures approximately 30 m (98 ft) in width; erosion is severe along the eastern portion of the canal. Dredged material is spread across an area that measures approximately 20 m (66 ft) in width along each canal bank. The overall area consists of inundated marsh. Vegetation atop the existing dredge piles consists primarily of marsh grass and the elevation atop the dredge piles measures approximately 0.76 m (2.5 ft) amsl.

Phase I cultural resources inventory of the Canal 2 item consisted of pedestrian survey and shovel testing throughout limited portions of the project area (Figure 43). Shovel Test 1, located on the south bank of the canal, was situated approximately 15 m (49 ft) from the canal edge. It was excavated to a depth of 50 cmbs (19.7 inbs). Water was encountered at a depth of 45 cmbs (17.7 inbs). Shovel Test 2 was located on the north bank of the canal, and it was situated approximately 15 m (49 ft) north of the canal edge. Shovel test 2 was excavated to a depth of 100 cmbs (39.4 inbs).

Shovel Test 1 contained two strata in profile while Shovel Test 2 exhibited three strata in profile. Stratum I was characterized as a layer of very dark grayish brown (10YR 3/2), loamy clay that extended to a depth of approximately 30 cmbs (11.8 inbs). Stratum II was described as a layer of gray (10YR 6/1) clay that terminated at an approximate depth of 65 cmbs (25.6 inbs). Finally, stratum III was characterized as a layer of very dark grayish brown (10YR 3/2) clay. No cultural material or evidence of intact cultural deposits was recovered/observed during survey of the Canal 2 project item. No additional testing of the Canal 2 project item is recommended.

Canal 3

Canal 3 is located on the north shore of Marsh Island, and it measures approximately 55 m (180.5 ft) in width at its mouth (Figure 2, Sheet 2). The elevation of this area is approximately 0.76 m (2.5 ft) amsl. During survey, areas of dredged material were observed throughout a zone that measures approximately 20 to 30 m (66 to 98 ft) in width; this material was located on both the east and west bank of the canal. Inundated marsh lay beyond these deposits. Vegetation throughout the Canal 3 survey area ranges from willow trees with a scrub understory along the east bank, to marsh grass interspersed with hardwoods on the west bank.

During the Phase I cultural resources assessment of the Canal 3 project item, two shovel tests were excavated at the mouth of the canal (Figure 44). Both Shovel Test 1, located on the east bank of the canal, and Shovel Test 2, located on the west bank of the canal, were situated approximately 15 m (49 ft) from the canal mouth. Each shovel test was excavated to a depth of 100 cmbs (39.4 inbs) and displayed two strata in profile. Stratum I was characterized as a layer of very dark grayish brown (10YR 3/2) loamy clay that extended to a depth of approximately 50 cmbs (19.7 inbs). Stratum II was characterized as a layer of light brownish gray (10YR 6/2) clay that extended from 50 - 100 cmbs (19.7 - 39.3 inbs). No cultural material was recovered and no evidence of intact cultural deposits was observed during the Phase I survey of Canal 3. No additional testing of Canal 3 is recommended.

Canal 4

Canal 4 measures approximately 30 m (98 ft) in width, and it is located on the north shore of Marsh Island (Figure 2, Sheet 1). The elevation at Canal 4 is approximately 0.76 m (2.5 ft) amsl. Prior to the examination of Canal 4, a previous effort had been made to close the canal. This effort resulted in the deposition of riprap, which now partially obscures the mouth of the canal. Dredged material extended across an area that measured approximately 30 m (98.5 ft) in width along the west bank and approximately 20 m (65.6 ft) in width along east bank of the canal. Both piles of the dredge material abut inundated marsh. Vegetation along the west bank consists primarily of bamboo, whereas an understory of scrub with willow trees dominates the east bank.

During the Phase I cultural resources assessment of the Canal 4 project item, a visual survey was conducted along the bankline and two shovel tests were excavated at the mouth of the canal (Figure 45). Shovel Test 1, located on the west bank, was situated approximately 15 m (49 ft) from the edge of the canal and it was exca-

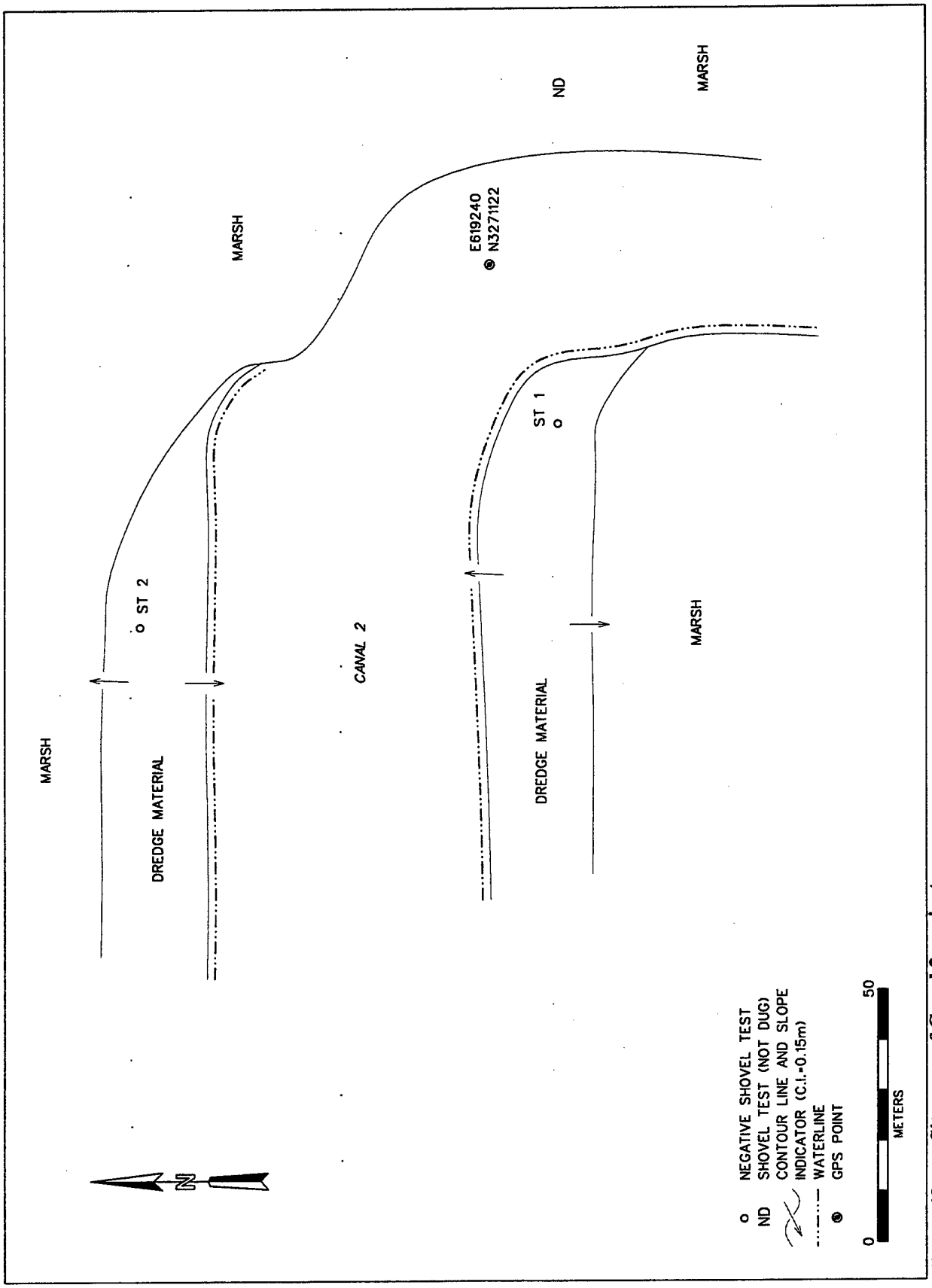

Figure 43. Site map of Canal 2 project area.

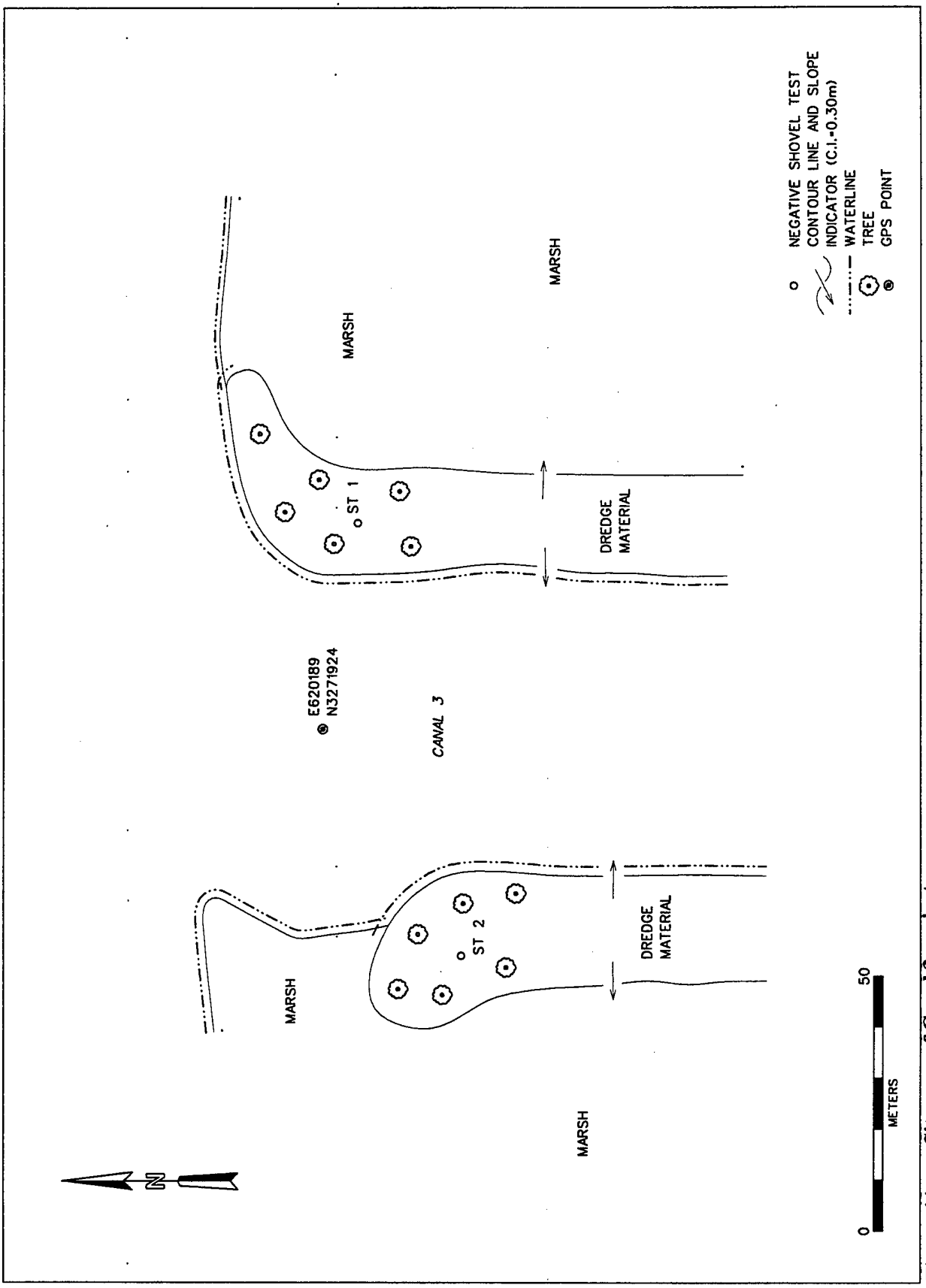

Figure 44. Site map of Canal 3 project area.

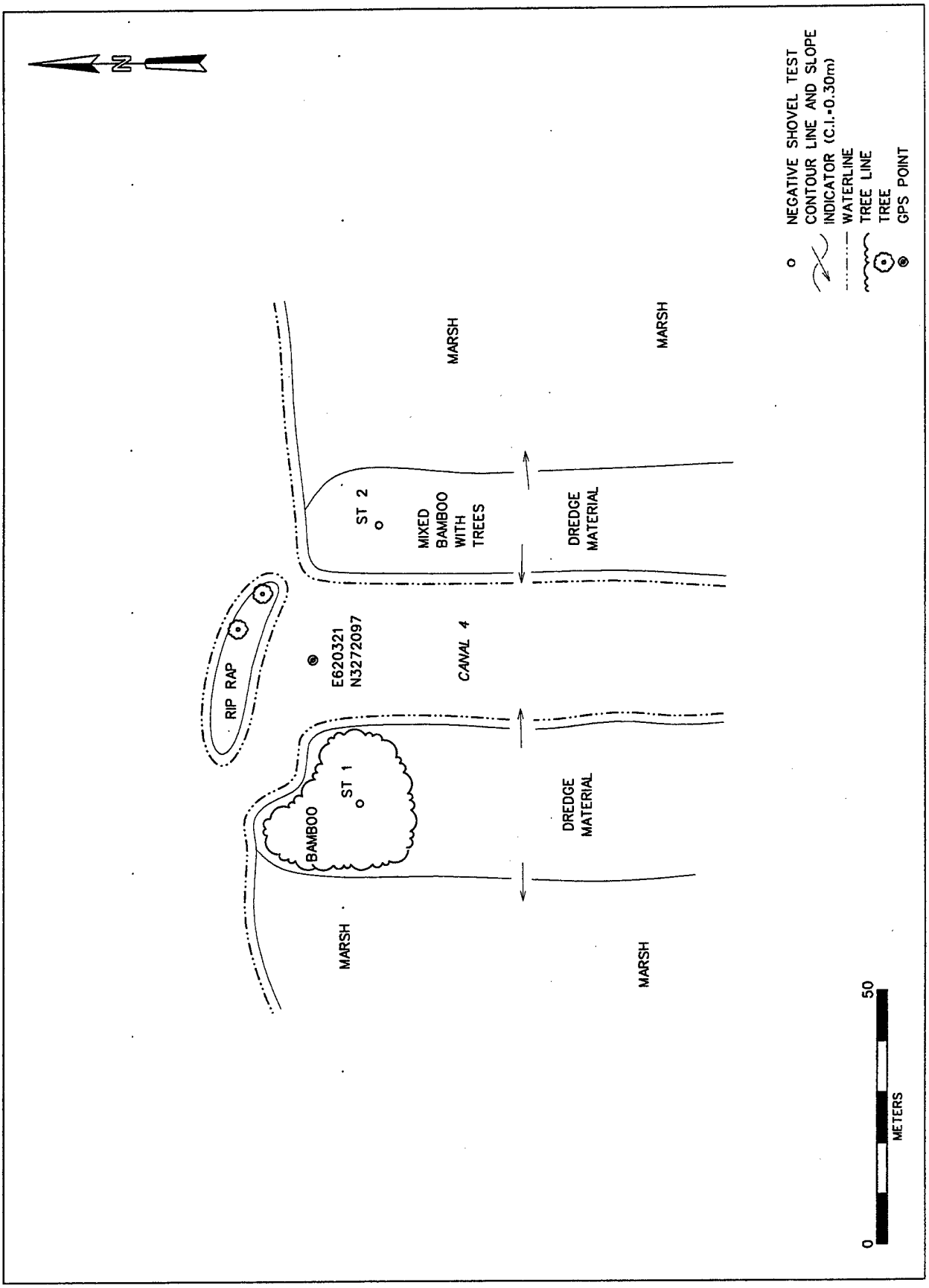

Figure 45. Site map of Canal 4 project area.

vated to a depth of 80 cmbs (31.5 inbs). Shovel Test 2 was located on the east bank of the canal and approximately 15 m (49 ft) from the canal edge. Shovel Test 2 was excavated to a depth of 85 cmbs (33.5 inbs). The excavation of each shovel test was hampered by breaching the water table.

Both survey shovel tests displayed two strata in profile. Stratum I was characterized as a layer of very dark grayish brown (10YR 3/2) loamy clay that extended to a depth of approximately 7 cmbs (2.8 inbs). Stratum II was described as a layer of pale brown (10YR 6/3) clay and muck that extended to approximately 85 cmbs (33.5 inbs). No cultural material or evidence of intact cultural deposits was identified during the Phase I cultural resources survey of Canal 4. No additional testing of the Canal 4 project item is recommended.

Canal 5

Canal 5 is located on the north shore of Marsh Island and it is oriented in an east-west direction (Figure 2, Sheet 2). Elevation throughout this area measured approximately 1.3 m (4.3 ft) amsl. The canal is 90 m (295.3 ft) wide and it traverses the marsh between West Cote Blanche Bay and Lake Sand. Areas of dredged material, measuring approximately 30 m (98 ft) in width, cover both banks of the canal. Flooded marsh can be found along either side of the banks of the canal. Vegetation throughout the area ranges from willow trees with a scrub understory on the north bank to marsh grass interspersed with hardwoods along the south bank.

During the Phase I cultural resources assessment of the Canal 5 project item, a visual reconnaissance was conducted along the bankline of the canal and two shovel tests were excavated near its mouth (Figure 46). Shovel Test 1 was located along the north bank of the canal and it was situated approximately 15 m (49 ft) north of the canal mouth. This shovel test was excavated to a depth of 100 cmbs (39.4 inbs). Shovel Test 2 was located approximately 15 m (49 ft) south of the canal and it was excavated to a depth of 80 cmbs (31.5 inbs); water was encountered at 75 cmbs (29.5 inbs) in this shovel test. Although no cultural material was recovered as a result of this survey effort, the remnants of a modern barge were located near the mouth of the canal on the north bank, and the remains of an abandoned, modern dock structure were observed on the south bank; the latter was constructed from metal poles and concrete. Neither of these objects appeared to be over 50 years in age and therefore neither is eligible for historic site status.

The two shovel tests excavated at Canal 5 displayed slightly different stratigraphic profiles. Shovel Test 1 contained two strata in profile. The first stratum, Stratum I, consisted of a 60 cm (23.6 in) layer of brown (10YR 4/2) loam. This was followed by Stratum II, a 40 cm (15.8 in) layer of dark gray (10YR 4/1) clay. Shovel Test 2 contained four strata in profile. Stratum I was characterized by a 12 cm (4.8 in) layer of very dark grayish brown (10YR 3/2) humus. This was followed by a layer of grayish brown (10YR 5/2) humus that extended to approximately 25 cmbs (9.9 inbs). Stratum III was characterized as a dark grayish brown (10YR 4/2) clay that extended to a depth of 50 cmbs (19.7 inbs). Stratum IV was described as a 30 cm (11.8 in) layer of very fluid light gray (10YR 7/1) clay. No non-modern cultural material was identified during the Phase I cultural resources assessment of the Canal 5 project item. No additional testing of Canal 5 is recommended.

Canal 6

Canal 6 is located on the north shore of Marsh Island and it is oriented in a northeast-southeast direction (Figure 2, Sheet 1). Elevations throughout the area measured approximately 0.76 m (2.5 ft) amsl. This canal measures approximately 55 m (180.5 ft) in width, and it intersects the mouth of Hawkins Bayou. Dredged material occurs across an area that measures roughly 10 m (32.8 ft) in width along the southwest bank of the canal and approximately 25 m (82 ft) in width along the northeast bank of the proposed project item. Both piles of dredge material are surrounded by inundated marsh. Vegetation throughout the area consists primarily of willow trees with an understory of scrub.

During this Phase I cultural resources assessment, two shovel tests were excavated near the mouth of Canal 6 (Figure 47). In addition, a visual reconnaissance was conducted along both banks. Shovel Test 1 was located on the northeast bank of Canal 6 and approximately 15 m (49 ft) from the edge of the canal; it was excavated to a

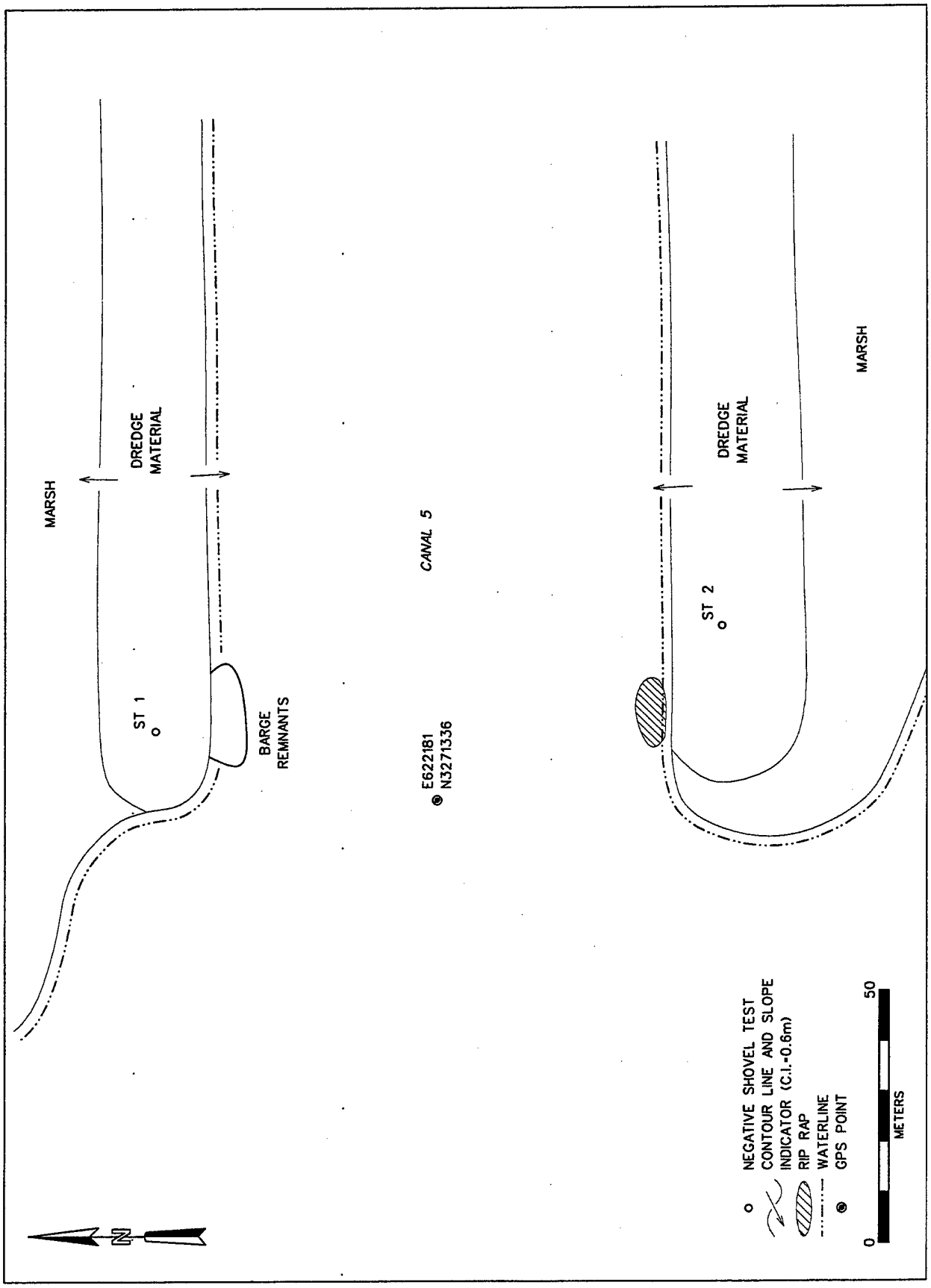

Figure 46. Site map of Canal 5 project area.

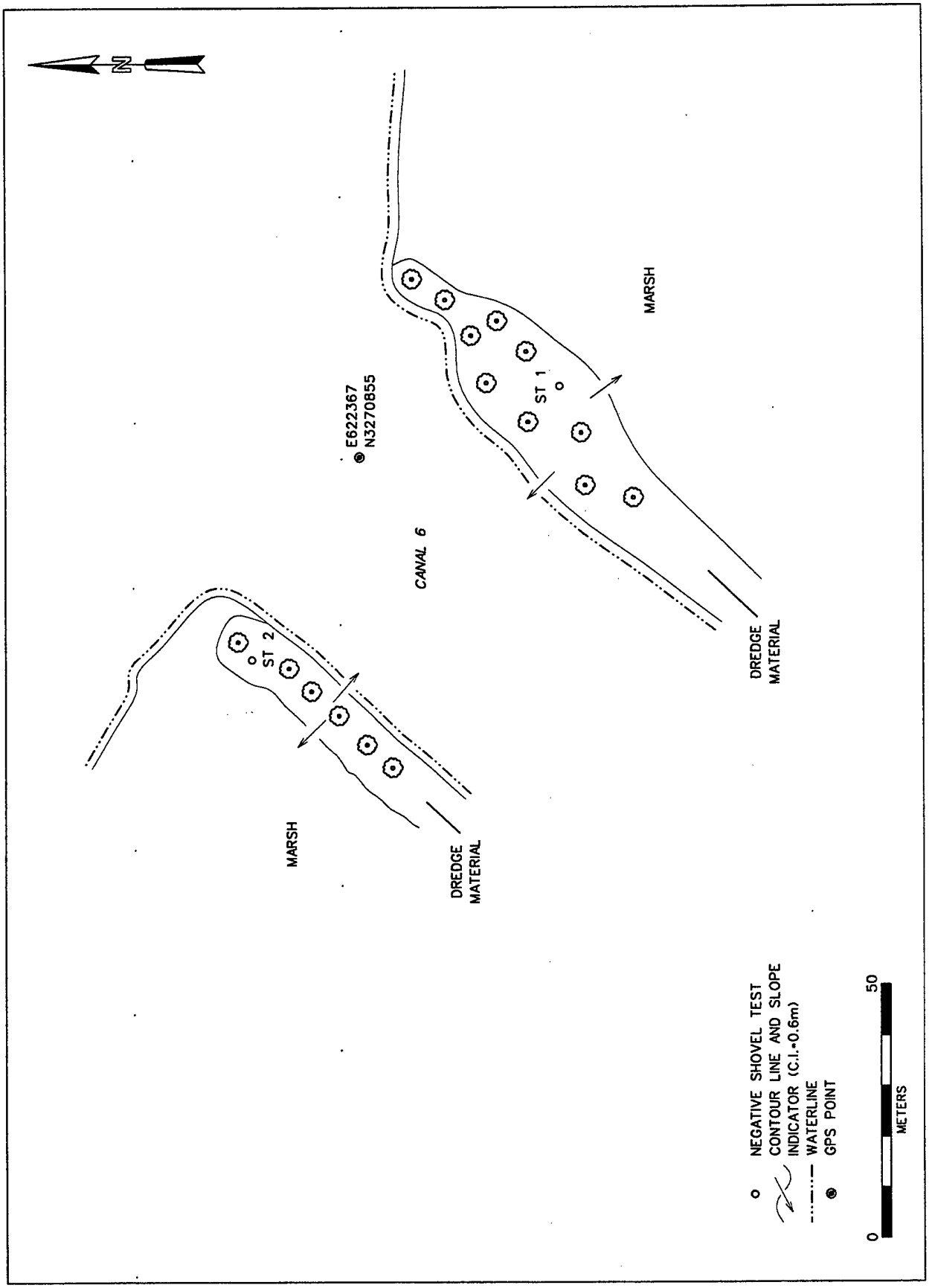

Figure 47. Site map of Canal 6 project area.

depth of 70 cmbs (27.6 inbs). Shovel Test 2 was situated approximately 10 m (32.8 ft) from the edge of the canal and along its southwest bank; it was excavated to approximately 70 cmbs (27.6 inbs).

Both survey shovel tests excavated during the Phase I cultural resources survey at Canal 6 displayed two strata in profile. Stratum I was characterized as a layer of brown (10YR 4/3) loam that extended to an approximate depth of 40 cmbs (15.8 inbs). Stratum II was described as a layer of grayish brown (10YR 5/2) hardpan clay that reached to 70 cmbs (27.6 inbs). No cultural material was observed/recorded during the Phase I cultural resources survey of the Canal 6 project item. No additional testing of Canal 6 is recommended.

Canal 7

Canal 7 is located on the north shore of Marsh Island and it is oriented in an approximately east-west direction (Figure 2, Sheet 3). Elevations throughout the project item measure approximately 1.6 m (5.3 ft) amsl. The canal measures approximately 90 m (295.3 ft) in width; it continues through the marsh west from an unnamed canal that houses an existing Texas Eastern pipeline. As a result, Canal 7 does not actually front on West Cote Blanche Bay. Areas of dredged material cover an area that measures approximately 15 m (49.2 ft) along either bank. This material was surrounded by inundated marsh; vegetation throughout the area included willow trees with a scrub understory interspersed with marsh grass.

During the reconnaissance survey of the Canal 7 project item, two shovel tests were excavated near the mouth of the canal (Figure 48). Both Shovel Test 1, located on the south bank of the canal, and Shovel Test 2, located on the north bank, were situated approximately 10 m (49 ft) from the canal mouth. Each of these shovel tests extended to a depth of approximately 100 cmbs (39.4 inbs).

Both Canal 7 survey shovel tests displayed three strata in profile. Stratum I was characterized as a layer of black (10YR 2/1) loamy clay that extended to approximately 40 cmbs (15.8 inbs). Stratum II was described as a 30 cm (11.8 in) layer of gray (10YR 6/1) clay. Stratum III consisted of a 30 cm (11.8 in) layer of a very dark gray (10YR 3/1) fluid muck. No cultural material was observed or recovered during the survey of Canal 7. No additional testing of Canal 7 is recommended.

Canal 8

Canal 8 is located in the interior of Marsh Island at the anterior (west) end of Hawkins Bayou (Figure 2, Sheet 1). The elevation of this project item is approximately 0.46 m (1.5 ft) amsl. The canal measures approximately 73 m (239.5 ft) in width, and it is situated roughly in a north-south orientation. The area is defined by a number of small islands to the west and a solid bankline to the east. The two eroding portions of the canal bank to the west are composed wholly of dredge material and both are completely surrounded by water. The east bank contained an 8 m (26.3 ft) wide area of dredge material, which is dispersed eastward into the surrounding marsh. Vegetation along both banks includes marsh grass interspersed with willow trees and other hardwoods.

During the Phase I cultural resources survey of the Canal 8 project item, four shovel tests were excavated; two were placed at the mouth of the canal, while the remaining two shovel tests were used to examine the west bank of the canal (Figure 49). In addition to shovel testing, the entire project item was examined visually for cultural material or for evidence of intact cultural deposits. All shovel tests were situated within 5 m (16.4 ft) of the edge of the canal, and each was excavated to a depth of approximately 100 cmbs (39.4 inbs).

A typical survey shovel test displayed two strata in profile. Stratum I was characterized as a layer of brown (10YR 4/3) loam that extended to a depth of approximately 30 cmbs (11.8 inbs). Stratum II was characterized as a layer of dark gray (10YR 4/1) wet clay that ranged from approximately 30 - 100 cmbs (11.8 - 39.4 inbs) in depth. No cultural material was observed or recovered during the Phase I cultural resources survey of the Canal 8 project item. No additional testing of this area is recommended.

Canal 9

Canal 9 is located in the north shore of Marsh Island and it is oriented in a roughly north-south direction (Figure 2, Sheet 3). Elevations

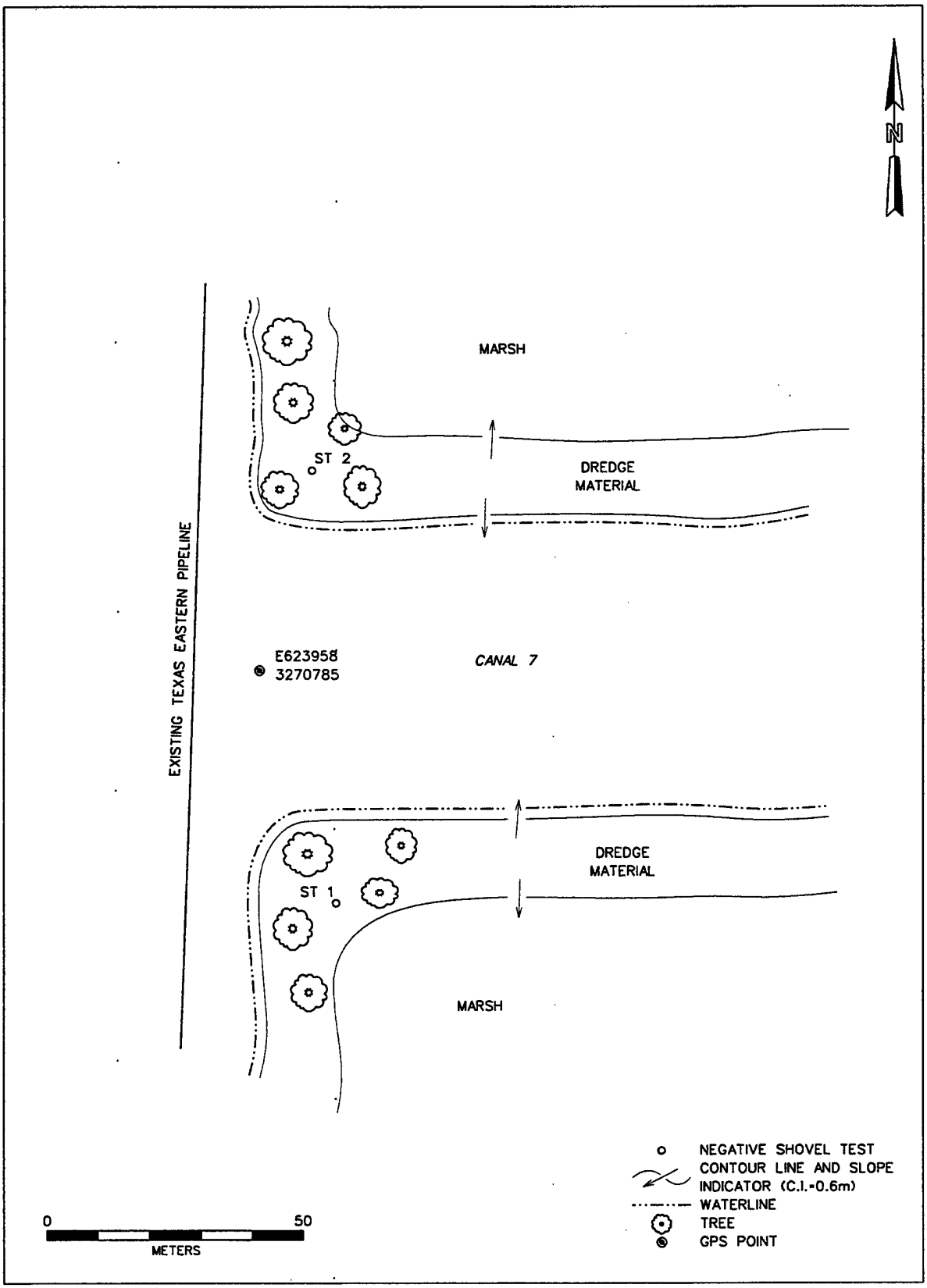

Figure 48. Site map of Canal 7 project area.

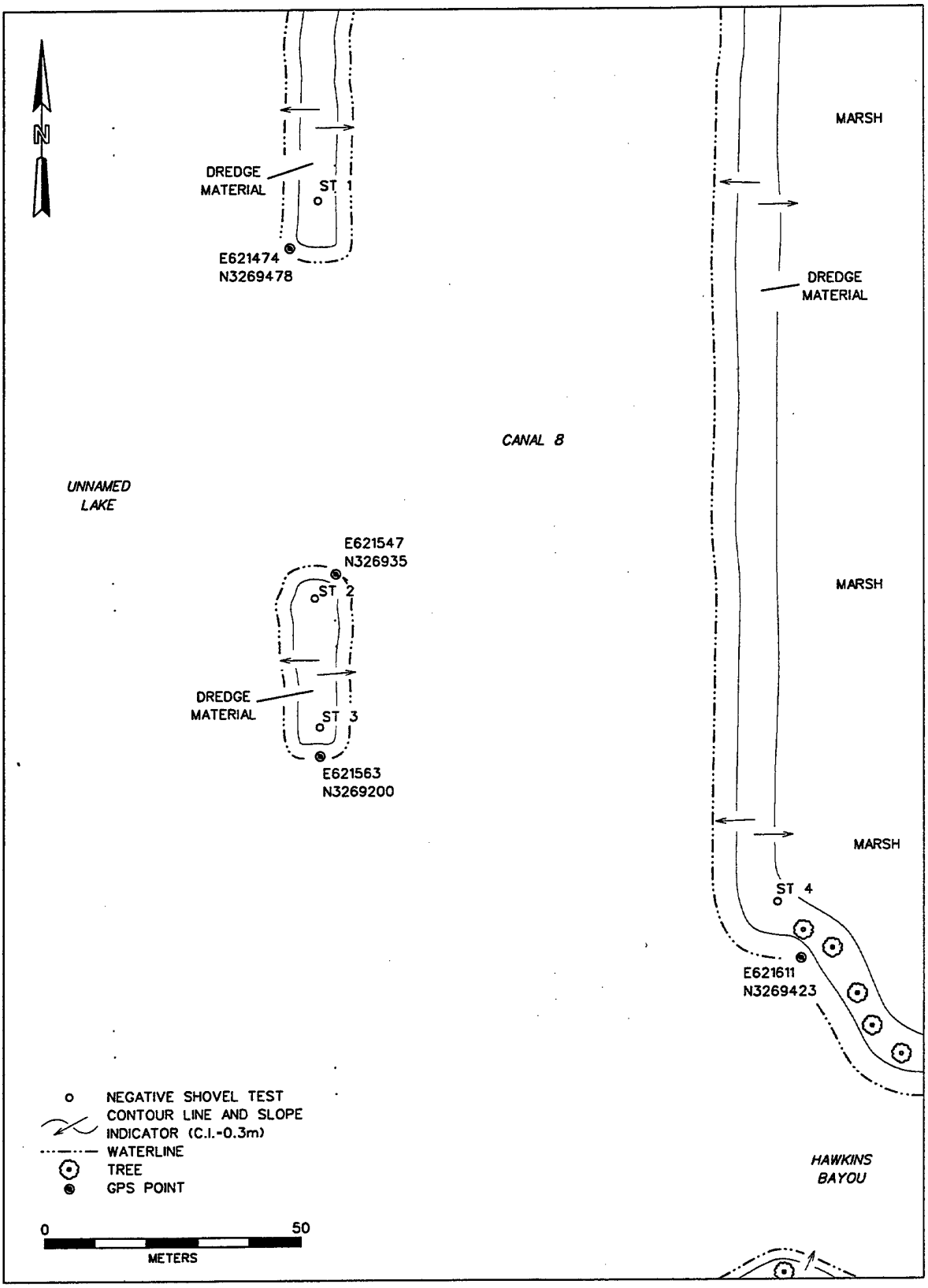

Figure 49. Site map of Canal 8 project area.

throughout the Canal 9 area range from 0.61 to 1.2 m (2.0 to 4.0 ft) amsl. Canal 9 is the longest of the canals surveyed on Marsh Island. The southern portion almost meets East Cote Blanche Bay and the north end lies opposite the south end of Canal 8 (Figure 2, Sheet 3). Canal 9 measures approximately 65 m (213.3 ft) in width, and it contains a large unnamed marsh lake approximately midway along its length. Areas of dredged material, covering approximately 20 m (65.6 ft) in width, occur along either bank of the canal; this material is surrounded by inundated marsh. Vegetation within the Canal 9 project item consists of marsh grass interspersed with willow trees and a scrub understory.

During the current Phase I cultural resources assessment, five shovel tests were excavated; three of these shovel tests were situated at the north end of the canal, while the remaining two were placed along the edge of the canal and at the southern portion of the unnamed marsh lake (Figure 50). In addition, a visual reconnaissance of the entire project item bankline was completed to ensure complete and thorough coverage of this location. Each shovel test was excavated to a depth of 100 cmbs (39.4 inbs) or until water hindered the archeological investigations.

The stratigraphy observed throughout the project item varied. Shovel Test 1, for example, contained two strata in profile. Stratum I was characterized by a deposit of dark brown (10YR 3/3) humus that extended to a depth of approximately 35 cmbs (13.8 inbs). Stratum II was described as a 65 cm (25.6 in) layer of dark gray (10YR 4/1) clay that extended from 35 - 100 cmbs (13.8 - 39.3 inbs). The soil profile in Shovel Test 2 was characterized as a layer of dark gray (10YR 4/1) clay; it extended to a depth of 100 cmbs (39.4 inbs). Shovel Test 3 contained two strata in profile. Stratum I was described as a deposit of dark brown (10YR 3/3) humus that extended to 10 cmbs (4.0 inbs). Stratum II exhibited a layer of light gray (10YR 7/1) clay that extended from 10 to 46 cmbs (4.0 to 19.7 inbs); water seepage prevented additional excavation within this shovel test. Shovel Tests 4 and 5 were excavated near the central portion of the Canal 9 project item. Shovel Test 4 contained only one stratum in profile; it was characterized as a layer of gray (10YR 6/1) clay that extended to approximately 50 cmbs (19.7 inbs); water was encountered in this shovel test at a depth of 40 cmbs (15.8 inbs). Shovel Test 5 contained two strata. Stratum I exhibited a layer of gray (10YR 6/1) clay that extended to a depth of 40 cmbs (15.7 inbs). Stratum II was characterized as a layer of dark grayish brown (10YR 4/2) clay; water was encountered within Shovel Test 2 at 43 cmbs (16.9 inbs). No cultural material was recovered and no evidence of intact cultural deposits was identified during the Phase I cultural resources investigations of the Canal 9 project item. No additional testing of this area is recommended.

Hawkins Bayou

Visual reconnaissance and marine remote sensing operations conducted in Hawkins Bayou identified three dock posts (Target 26) along the western bank of this project item (Figure 2, Sheet 2). This area was designated Locus 1. Terrestrial investigation of the locus included pedestrian survey of the bayou bank, probing, and shovel test excavation. Vegetation throughout the area consisted of thick marsh grass interspersed by willow trees. Elevation across the project area measured approximately 0.92 m (3 ft) amsl.

Hawkins Bayou is located on the northeast portion of Marsh Island and it flows north into West Cote Blanche Bay. The bayou measures approximately 20 m (65.7 ft) in width and the bayou bank is characterized by dredge material, which is surrounded by inundated marsh. During the current Phase I cultural resources assessment, a 10 m^2 (32.8 ft^2) survey grid, divided into four quadrants, was established west of the dock area (Figure 51). This area was examined using a 1.2 m (4.0 ft) metal probe. In addition, a single shovel test was excavated in the area; water was encountered in this shovel test at a depth of 50 cmbs (19.7 inbs). The shovel test displayed only one stratum in profile; it consisted of a layer of very dark grayish brown (10YR 3/2) wet muck (Figure 52). No objects were detected during probing or shovel testing, and no cultural material was recovered as a result of this investigation. These results demonstrate that Locus I lacks research potential. This locus does not possess the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional testing of Locus 1 or the Hawkins Bayou project item is recommended.

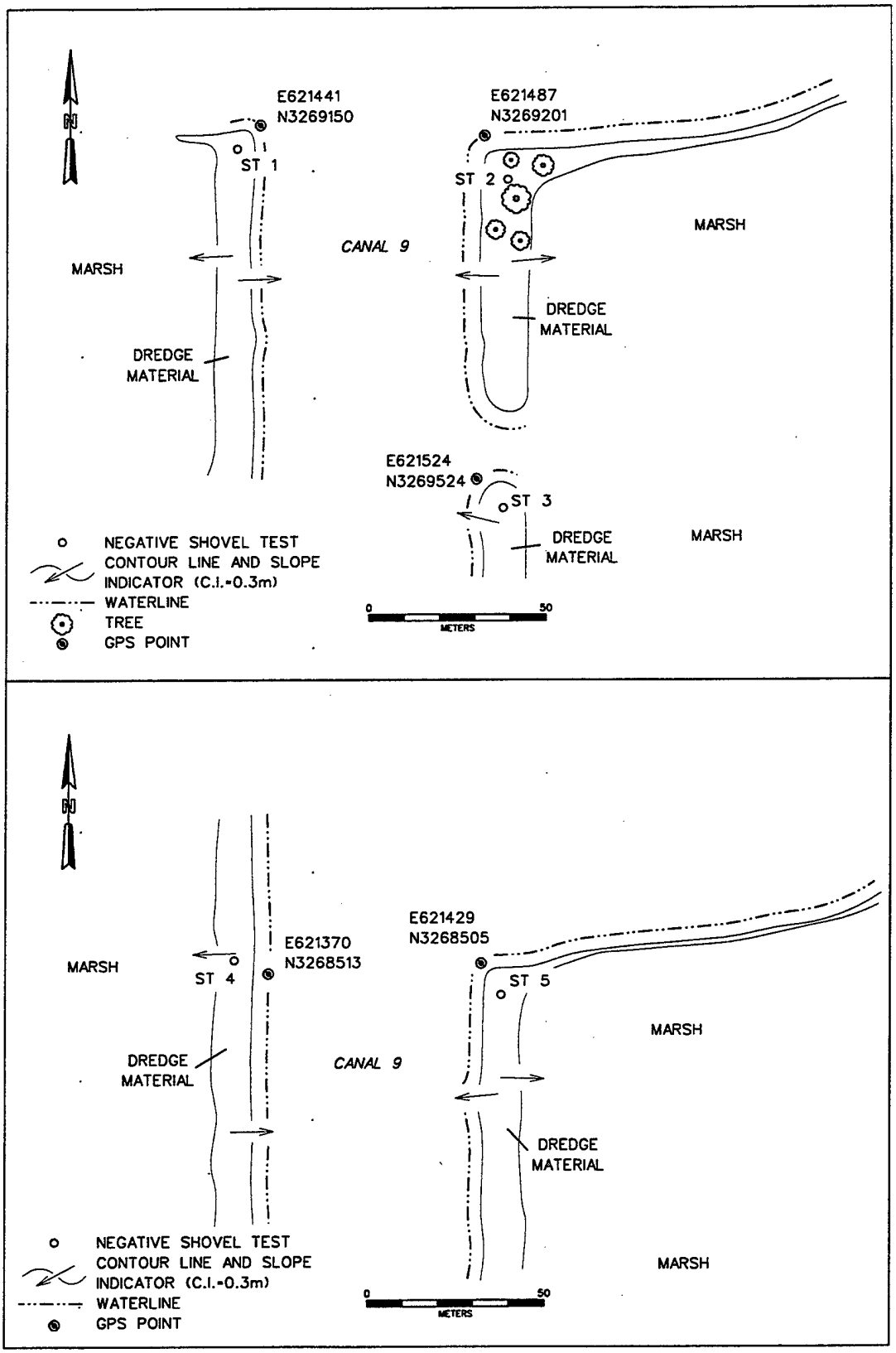

Figure 50. Site map of Canal 9 project area.

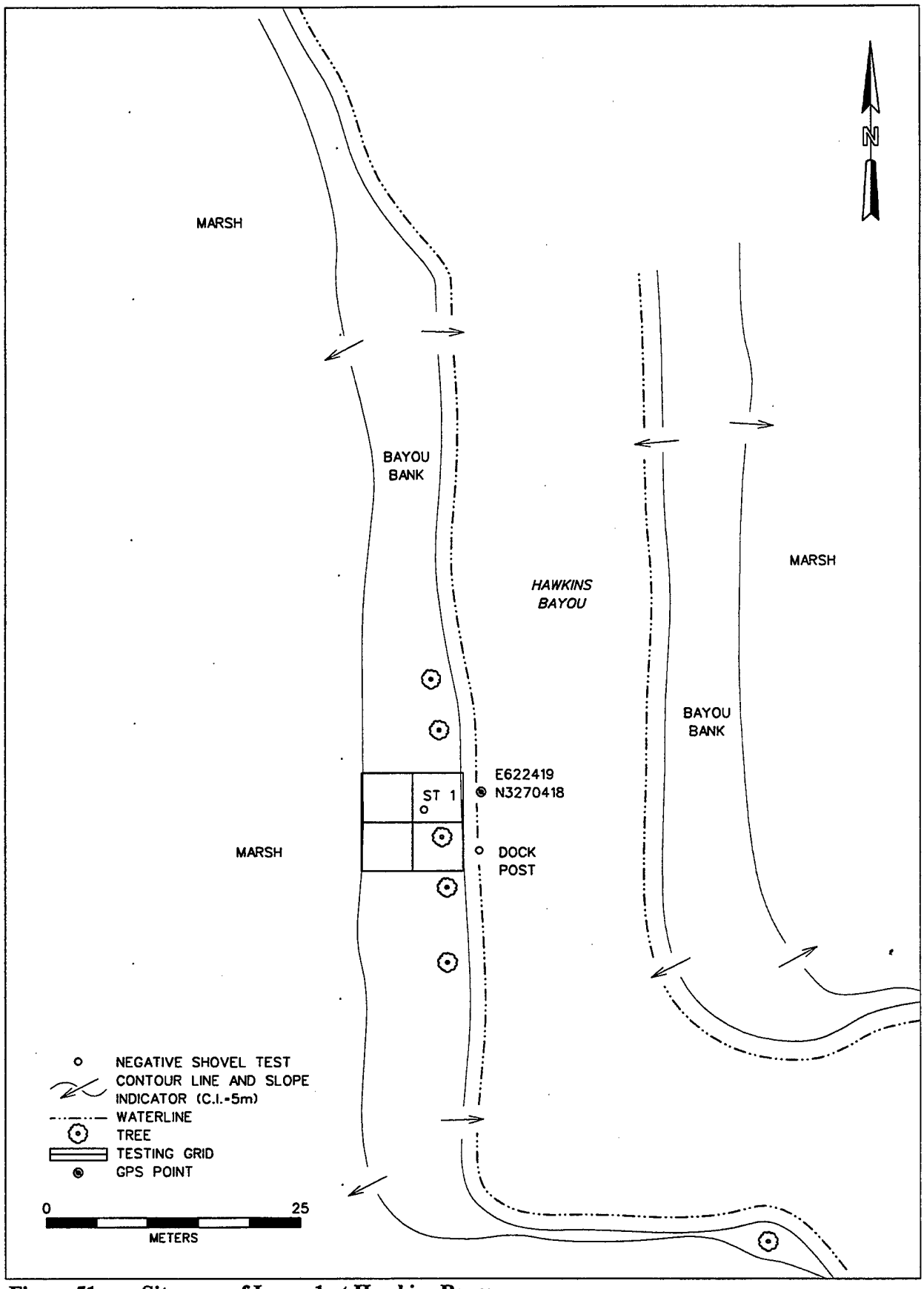

Figure 51. Site map of Locus 1 at Hawkins Bayou.

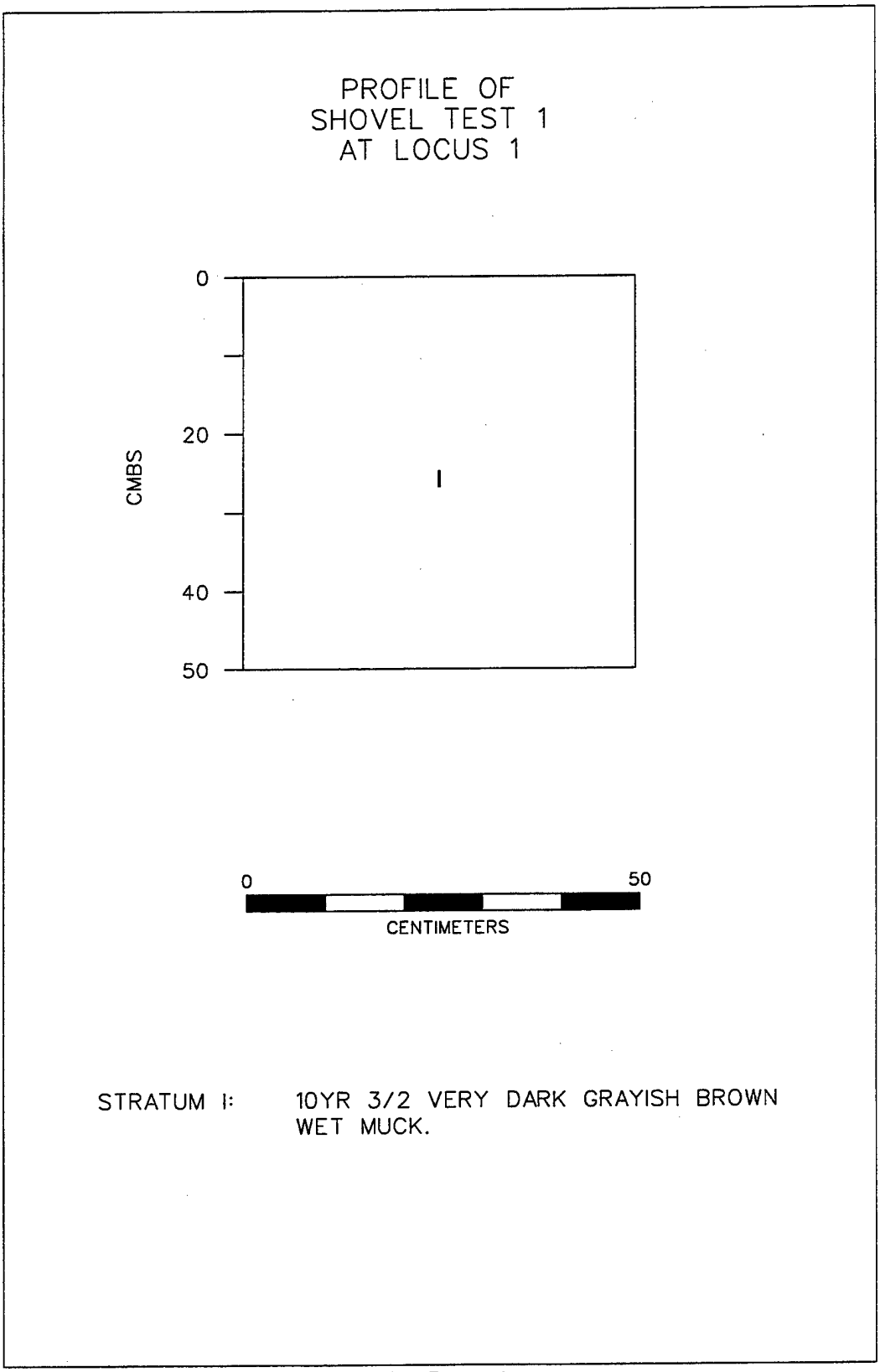

Figure 52. Profile of Shovel Test 1 at Locus 1.

Project Summary

The marine remote sensing survey included the use of a side scan sonar, a fathometer, and a proton precession magnetometer to evaluate the potential of the underwater project items to contain significant cultural resources. A total of 26 magnetic target clusters and 15 acoustic anomalies associated with anomalous magnetic perturbations were identified as a result of this investigation. One of these target clusters spans the outer quarter of the survey area in East Cote Blanche Bay. This anomaly appears to be a pipeline or a cable area. While not culturally significant, the anomaly may pose some safety concerns.

Anomalies worthy of additional investigation include Target 1, Target 2, Target 4, and Target 11. Target 1 consists of anomalies M15 and M16. Target 2 includes anomalies M18, M21, M20, and M23. Target 4 is comprised of anomalies M26, M27, M28, M30, and M31. Finally, Target 11 consists of anomalies M65 and M67. Each of these target areas may represent submerged cultural resources. Additional testing to determine the source of these target areas consequently is recommended.

The remaining anomalies located in the East Cote Blanche Bay survey area, adjacent to Marsh Island, appear to be caused by isolated modern ferrous debris. Considering the dearth of acoustic anomalies identified, the low amplitude of the magnetic disturbances, and the isolated nature of the magnetic perturbations, these anomalies have little potential to represent the remains of significant cultural resources. No additional archeological investigations are warranted for anomaly clusters incorporating Targets 3, 5 - 10, and 12 - 26.

Terrestrial Survey

No cultural resources were recorded as a result of the Phase I cultural resource survey of the 11 terrestrial project items (Shoreline Protection Project Item, Sand Lake Closure Project Item, and Canals 1-9). However, one partially submerged cultural resource locus (Locus 1) was identified during marine remote sensing survey and it subsequently was investigated during terrestrial survey. Locus 1, which lies along the bankline of Hawkins Bayou, produced no cultural material, and it did not warrant archeological site status. This locus does not possess the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No other archeological sites or standing structures (built properties) were identified as a result of the investigation. No additional testing of Locus 1 or of the 11 proposed terrestrial project items is recommended.

CHAPTER VIII

SUMMARY AND MANAGEMENT RECOMMENDATIONS

This Phase I marine and terrestrial cultural resources survey and archeological inventory of the proposed Marsh Island Hydrologic Reconstruction project items in Iberia Parish, Louisiana resulted in the recordation of four marine anomalies (Targets 1, 2, 4, and 11) and one non-site historic period locus (Locus 1). This discussion summarizes data associated with both the marine and terrestrial components of this undertaking and it provides recommendations for the management of the identified resources.

Summary and Recommendations – Marine Survey

The Marsh Island underwater project areas are located in East Cote Blanche Bay and Hawkins Bay in Iberia Parish, Louisiana. During marine remote sensing survey, approximately 176.61 linear km (109.74 linear mi) of bay/bayou bottom were examined for evidence of historically significant cultural resources. The primary objective of this study was to identify all submerged and visible watercraft and other maritime related features that might lie within the underwater Marsh Island project areas, and to assess the significance of these resources applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

This investigation included the use of a fathometer, a side scan sonar, and a recording proton precession magnetometer. The investigation resulted in the identification of 158 individual magnetic anomalies comprising 26 target areas. A total of 36 acoustic anomalies also were recorded, 13 of which were associated with magnetic anomalies. A variety of modern magnetic sources such as crab traps, trotlines, pipelines, well heads, pumping and heating stations, and cables were identified during survey. Each of these features provided some distortion to the magnetic data. The acoustic data recorded during survey showed evidence of numerous isolated targets that appeared to be modern debris (e.g., crab traps).

Despite the amount of modern debris noted throughout the area, however, some of the magnetic and acoustic data recorded during survey (Targets 1, 2, 4, and 11) may represent the remains of potentially significant cultural resources such as shipwrecks. Each of these targets is recommended for additional testing. Both diver inspection and additional archival investigations will be required to assess their significance applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Subsurface Diver Search

Initial relocation should be accomplished using DGPS and then by placing a buoy at the presumed center point of each target. Once the location of each target has been reacquired and buoyed, underwater archeologists should inspect and map the area. The survey should be conducted using concentric, radial sweeps that extend out from the buoyed position(s) to determine if the anomalies lie exposed on the bay bottom. Depending upon underwater visibility, expected to be less than .91 m (3 ft), this initial diver inspec-

tion should be made in circles at 1.5 m (5 ft) intervals from the center point. An effective method is to have two divers make the search. The first diver should explore the bottom and use a thin metal probe to look for buried features. This diver will move out from the center in 1.5 m (5 ft) intervals, or other intervals based on visibility and conditions. Each time the diver moves to the next interval, the second diver should sweep the area just covered by the first diver with a submersible metal detector. This radial pattern of diver investigation should be carried out for a minimum distance of 7.6 m (25 ft). The position of any features located during the search should be recorded via distance and bearing from the center of the search area. Any cultural material located during the search should be recorded and marked for further investigation.

Archival Research

Should diver investigations determine that the anomalies represent potentially significant cultural resources, archival research will be necessary as an aid to determine their significance. The evaluation of historic sites is largely dependent upon the quality of historic information that can be developed to address the specific research themes outlined in National Register Bulletin No. 20. Identification of analogs through research also helps in site interpretation. Documentary research can gather information on specific areas or sites and help to relate those sites to the larger maritime community. Information on specific areas or sites can be acquired from a wide variety of sources, including customs and trade records, lighthouse records, lifesaving station records, insurance records, military records, vessel registration and inspection documents, private papers, ship's logs, harbormasters reports, shipyard records, shipwreck reports, and local newspapers. Archival research should seek to identify the resource and assess its significance relative to themes identified in *Louisiana's Comprehensive Archaeological Plan* (Smith et al. 1983).

Summary and Recommendations – Terrestrial Survey

Only one cultural resources locus (Locus 1) was recorded during the Phase I cultural resources survey of the terrestrial portion of the proposed Marsh Island Hydrologic Restoration Project areas. Located on the shoreline of Hawkins Bayou, this locus may represent the remains of a dock structure associated with operations conducted on Marsh Island by the oil, trapping, or fishing industries. The only remains visible at the site are a series of four posts, three of which are visible at low tide only. These posts extended from the shoreline east into Hawkins Bayou. The material used in the construction of this structure dates from the twentieth century. Although a structure near this location is illustrated on historic period maps of the area dating prior to 1951, field investigations failed to identify any cultural material that would indicate the remains of a structure. This locus produced no artifacts and although the physical remains of the dock structure were recorded, no site number was assigned. Locus 1 does not possess the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional testing of Locus 1 is recommended.

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APPENDIX I

MAGNETIC ANOMALIES FROM SURVEY AREA 1

Table 1. Inventory of Magnetic Anomalies from the Marsh Island Marine Remote Sensing Survey; Survey Area 1.

ANOM #	LINE	DATE	TIME	DURATION (SECONDS)	GAMMA /SIGNATURE	X (NAD 83)	Y (NAD 83)	CORRELATIONS BETWEEN MAGNETIC AND ACOUSTIC ANOMALIES
M1	20	7/21/98	14:52:56 14:53:00	4.0	28.0 M	3149596.2	375759.1	NONE
M2	20	7/21/98	14:54:41 14:54:49	8.0	46.0 D	3150077.0	376147.8	NONE
M3	21	7/21/98	15:18:49 15:18:57	8.0	40.0 M	3150555.5	376381.7	NONE
M4	22	7/21/98	15:36:23 15:36:33	10.0	19.0 D	3151935.1	377362.1	NONE
M5	22	7/21/98	15:40:14 15:40:32	18.0	41.0 M	3152874.0	378037.6	NONE
M6	25	7/21/98	16:21:11 16:21:15	4.0	49.0 -	3151322.9	376831.8	NONE
M7	25	7/21/98	16:23:07 16:23:11	4.0	172.5 D	3150901.1	376311.3	NONE
M8	25	7/21/98	16:26:43 16:26:46	3.0	32.0 D	3149820.3	375644.3	NONE
M9	28	7/21/98	17:14:13 17:14:16	3.0	16.5 -	3151493.8	376700.0	NONE
M10	32	7/21/98	18:13:30 18:13:50	20.0	89.0 -	3150024.6	375443.2	NONE
M11	33	7/21/98	18:38:03 18:38:09	6.0	85.0 D	3151560.0	376405.2	NONE
M12	36	7/22/98	08:38:29 08:38:37	8.0	27.5 D	3152317.4	376716.9	NONE
M13	38	7/22/98	10:27:02 10:27:12	10.0	50.5 M	3152594.4	376846.9	NONE
M14	40	7/22/98	11:26:34 11:27:07	33.0	16.5 +	3151946.6	376242.5	NONE
M15	40	7/22/98	11:32:50 11:33:07	17.0	14.0 -	3150695.7	375361.1	NONE
M16	41	7/22/98	11:41:34 11:42:00	26.0	187.5 +	3150711.1	375298.6	NONE
M17	42	7/22/98	12:07:34 12:08:19	45.0	18.0 +	3151723.2	375962.5	NONE
M18	42	7/22/98	12:10:20 12:10:34	14.0	513.5 D	3151217.2	375583.9	NONE
M19	43	7/22/98	13:58:46 13:58:52	6.0	262.5 -	3151707.2	375863.0	NONE
M20	43	7/22/98	13:59:53 14:00:01	8.0	230.0 D	3151363.2	375632.7	NONE
M21	45	7/22/98	12:24:51 12:25:04	13.0	135.5D	3151438.7	375538.7	NONE
M22	48	7/22/98	14:52:33 14:52:42	9.0	40.5 D	3152800.2	376385.0	NONE
M23	48	7/22/98	14:56:03 14:56:11	8.0	68.0 D	3151655.4	375558.9	NONE
M24	60	7/22/98	16:57:45 16:57:51	6.0	40.0 D	3160773.6	374167.4	NONE
M25	60	7/22/98	17:02:23 17:02:31	8.0	12.5 -	3152077.5	375133.2	NONE
M26	63	7/22/98	17:39:06 17:39:20	14.0	244.5 D	3152945.4	375546.7	NONE
M27	64	7/22/98	17:53:46 17:54:00	14.0	112.5 +	3152925.9	375526.8	NONE
M28	65	7/22/98	18:03:16 18:03:20	4.0	124.5 +	3152852.6	375362.4	NONE
M29	66	7/22/98	18:24:19 18:24:35	16.0	198.5 +	3153446.2	375700.7	NONE

Table 1, continued

ANOM #	LINE	DATE	TIME	DURATION (SECONDS)	GAMMA /SIGNATURE	X (NAD 83)	Y (NAD 83)	CORRELATIONS BETWEEN MAGNETIC AND ACOUSTIC ANOMALIES
M30	67	7/22/98	18:32:08 18:32:13	5.0	130.0 D	3152942.4	375341.6	NONE
M31	68	7/22/98	18:47:00 18:47:03	3.0	789.0 -	3152857.4	375197.2	NONE
M32	69	7/22/98	18:55:15 18:55:18	3.0	33.5 D	3153356.6	375480.1	NONE
M33	74	7/23/98	09:35:20 09:35:24	4.0	84.0 D	3153312.1	375141.0	NONE
M34	75	7/23/98	09:48:06 09:48:14	8.0	21.0 D	3152747.2	374729.0	Crab trap
M35	75	7/23/98	09:52:51 09:52:58	7.0	147.0 D	3151503.1	373763.3	NONE
M36	77	7/23/98	10:08:44 10:08:49	5.0	76.5 M	3153238.5	374889.1	NONE
M37	78	7/23/98	10:20:11 10:20:20	9.0	43.5 -	3153216.1	374858.2	NONE
M38	78	7/23/98	10:22:02 10:22:05	3.0	37.0 +	3154034.7	375446.2	NONE
M39	79	7/23/98	10:32:34 10:32:51	17.0	78.0 M	3152239.5	374064.6	NONE
M40	80	7/23/98	10:40:57 10:41:07	10.0	43.5 D	3152239.9	374049.0	NONE
M41	80	7/23/98	10:43:42 10:43:50	6.0	21.5 D	3153317.7	374754.7	NONE
M42	80	7/23/98	10:44:52 10:44:55	3.0	30.5 +	3153749.1	375097.6	NONE
M43	80	7/23/98	10:45:17 10:45:27	10.0	13.5 -	3153926.5	375235.0	NONE
M44	80	7/23/98	10:46:22 10:46:28	6.0	22.0 D	3154337.8	375543.3	NONE
M45	81	7/23/98	11:10:49 11:10:57	8.0	26.5 D	3151765.7	373614.7	NONE
M46	86	7/23/98	12:17:22 12:17:29	7.0	83.5 -	3153582.0	374662.1	NONE
M47	89	7/23/98	13:09:22 13:09:30	7.0	27.5 -	3151561.6	373002.4	NONE
M48	89	7/23/98	13:09:46 13:09:49	3.0	76.5 -	3151637.2	373042.9	NONE
M49	93	7/23/98	15:00:36 15:00:33	3.0	189.5	3153223.1	373934.9	NONE
M50	93	7/23/98	15:00:05 15:00:08	3.0	128.0 D	3153431.7	374077.6	NONE
M51	93	7/23/98	15:09:44 15:09:49	5.0	160.5 -	3152867.5	373566.7	NONE
M52	97	7/23/98	15:39:24 15:39:31	7.0	51.5 M	3154952.9	374894.5	NONE
M53	98	7/23/98	15:51:50 15:51:59	9.0	247.0 D	3153805.4	374015.4	NONE
M54	100	7/23/98	16:08:53 16:08:56	3.0	18.5 D	3153553.9	373715.9	NONE
M55	100	7/23/98	16:10:04 16:10:10	6.0	29.0 M	3154156.5	374151.4	NONE
M56	104	7/23/98	16:42:29 16:42:33	4.0	141.0 D	3153805.2	373664.8	NONE
M57	105	7/23/98	16:51:03 16:51:07	4.0	26.5 +	3153980.4	373709.1	NONE
M58	106	7/23/98	16:59:24 16:59:28	4.0	166.0 D	3153310.8	373189.7	NONE
M59	106	7/23/98	17:03:01 17:03:05	4.0	40.5 -	3155021.2	374423.7	NONE

Table 1, continued

ANOM #	LINE	DATE	TIME	DURATION (SECONDS)	GAMMA /SIGNATURE	X (NAD 83)	Y (NAD 83)	CORRELATIONS BETWEEN MAGNETIC AND ACOUSTIC ANOMALIES
M60	108	7/23/98	17:13:01 17:13:08	7.0	30.5 M	3152184.5	372212.7	NONE
M61	109	7/23/98	17:26:58 17:27:01	3.0	14.5 D	3152279.1	372273.6	NONE
M62	110	7/23/98	17:32:08 17:32:15	7.0	74.0 +	3153914.2	373378.3	NONE
M63	111	7/23/98	17:47:06 17:47:12	6.0	20.0 M	3153196.1	372740.8	NONE
M64	111	7/23/98	17:53:34 17:53:46	12.0	47.5 D	3155587.1	374456.4	NONE
M65	112	7/23/98	17:58:11 17:58:24	13.0	222.5 M	3153041.5	372544.6	NONE
M66	113	7/23/98	17:37:31 17:37:36	5.0	425.5 +	3155613.7	374431.7	NONE
M67	114	7/23/98	18:03:04 18:03:18	14.0	123.0 M	3153013.0	372551.1	NONE
M68	115	7/23/98	18:17:49 18:17:53	4.0	68.5 D	3152757.5	372240.7	NONE
M69	115	7/23/98	18:18:02 18:18:06	4.0	33.5 D	3152652.5	372124.3	NONE
M70	117	7/23/98	18:31:39 18:31:43	4.0	413.0 D	3153990.1	372985.1	NONE
M71	118	7/23/98	18:37:24 18:37:26	2.0	30.0 D	3152913.6	372170.8	NONE
M72	118	7/23/98	18:39:32 18:39:46	14.0	15.0 +	3153978.8	372920.1	NONE
M73	119	7/23/98	18:52:20 18:52:26	6.0	46.0 D	3155672.8	374071.3	NONE
M74	119	7/23/98	18:52:44 18:52:59	15.0	16.5 -	3155381.0	373883.8	Correlates with acoustic anomaly A10
M75	120	7/23/98	19:05:57 19:06:07	10.0	305.5 D	3155376.9	373793.5	NONE
M76	120	7/23/98	19:06:43 19:06:52	9.0	32.0 +	3155725.8	374016.8	NONE
M77	121	7/24/98	07:49:27 07:49:40	13.0	31.0 D	3155416.5	373788.4	NONE
M78	121	7/24/98	07:51:30 07:51:35	5.0	22.5 D	3154387.6	373021.0	NONE
M79	123	7/24/98	08:06:39 08:06:43	4.0	62.0 D	3154445.2	372949.9	NONE
M80	124	7/24/98	08:11:56 08:11:58	2.0	34.5 +	3152725.5	371675.4	NONE
M81	125	7/24/98	08:22:58 08:23:03	5.0	29.0 +	3154427.9	372809.3	NONE
M82	126	7/24/98	08:32:34 08:32:37	3.0	34.0 D	3153435.5	372019.9	NONE
M83	126	7/24/98	08:33:39 08:33:42	3.0	12.0 D	3153973.3	372404.2	NONE
M84	126	7/24/98	08:34:28 08:34:33	5.0	69.0 D	3154403.1	372732.9	NONE
M85	127	7/24/98	08:48:02 08:48:08	6.0	33.5 D	3153399.5	371944.8	NONE
M86	127	7/24/98	08:51:44 08:51:49	5.0	36.5 D	3155173.1	373219.2	NONE
M87	128	7/24/98	09:03:15 09:03:26	11.0	140 +	3152877.9	371504.2	NONE
M88	128	7/24/98	09:06:06 09:06:11	5.0	29.0 D	3154262.6	372499.4	NONE
M89	128	7/24/98	09:09:34 09:09:39	5.0	125.0 D	3156010.5	373741.8	NONE

Table 1, continued

ANOM #	LINE	DATE	TIME	DURATION (SECONDS)	GAMMA /SIGNATURE	X (NAD 83)	Y (NAD 83)	CORRELATIONS BETWEEN MAGNETIC AND ACOUSTIC ANOMALIES
M90	129	7/24/98	09:01:10 09:01:24	14.0	38.0 +	3152919.4	371496.4	NONE
M91	130	7/24/98	08:44:55 08:44:58	3.0	123.0 +	3153090.8	371559.9	NONE
M92	132	7/24/98	09:20:33 09:20:37	4.0	21.5 -	3153677.7	371824.9	NONE
M93	132	7/24/98	09:21:26 09:21:36	10.0	15.0 +	3154160.5	372166.2	NONE
M94	134	7/24/98	09:49:47 09:50:35	48.0	854.5 M	3156409.9	373620.1	Correlates with acoustic anomaly A11 (PIPELINE)
M95	134	7/24/98	09:51:13 09:51:16	3.0	60.0 -	3156021.5	373412.1	NONE
M96	134	7/24/98	09:52:06 09:52:21	15.0	18.5 -	3155582.8	373087.8	NONE
M97	135	7/24/98	09:41:18 09:41:23	5.0	884.5 +	3155593.6	373036.7	PIPELINE
M98	136	7/24/98	10:02:11 10:02:29	18.0	38.0 -	3154397.0	372102.3	NONE
M99	137	7/24/98	10:09:15 10:09:34	19.0	512.5 M	3156186.4	373307.5	PIPELINE
M100	137	7/24/98	10:13:05 10:13:11	6.0	583.0 +	3154414.2	372071.4	NONE
M101	138	7/24/98	10:23:22 10:23:52	90.0	529.0 M	3156147.9	373244.1	PIPELINE
M102	139	7/24/98	10:27:17 10:27:38	21.0	540.0 M	3156109.5	373182.7	Correlates with acoustic anomaly A12 (PIPELINE)
M103	140	7/24/98	10:35:49 10:35:54	5.0	39.5 -	3153488.6	371209.1	NONE
M104	140	7/24/98	10:40:47 10:41:03	16.0	663.5 M	3155921.8	372943.5	PIPELINE
M105	141	7/24/98	10:44:59 10:45:16	17.0	1,055.0 D	3155901.0	372878.1	PIPELINE
M106	142	7/24/98	10:57:32 10:58:02	30.0	493.5 M	3155769.0	372722.5	NONE
M107	143	7/24/98	11:13:35 11:13:47	12.0	1,231.0 D	3155709.4	372666.7	PIPELINE
M108	144	7/24/98	11:18:19 11:19:23	64.0	567.5 D	3155629.4	372538.0	PIPELINE
M109	144	7/24/98	11:21:16 11:21:27	11.0	100.0 +	3154299.8	371558.8	Correlates with acoustic anomaly A19
M110	145	7/24/98	11:25:49 11:26:00	11.0	11.0 -	3153667.5	371007.3	NONE
M111	145	7/24/98	11:29:42 11:29:54	12.0	276.5 D	3155523.0	372371.0	Correlates with acoustic anomaly A21
M112	145	7/24/98	11:31:23 11:31:29	6.0	30.0 D	3156324.4	372913.0	NONE
M113	146	7/24/98	11:35:45 11:36:21	36.0	1934.0 D	3155414.1	372212.1	Correlates with acoustic anomaly A22 (PIPELINE)
M114	146	7/24/98	11:40:18 11:40:24	6.0	17.0 D	3153520.8	370846.5	NONE
M115	147	7/24/98	11:42:45 11:42:52	7.0	27.0 D	3153417.9	370738.8	Correlates with acoustic anomaly A23
M116	147	7/24/98	11:46:46 11:47:03	17.0	1620.0 D	3155384.7	372197.9	Correlates with acoustic anomaly A24 (PIPELINE)
M117	148	7/24/98	11:53:16 11:53:39	23.O	1471.0 M	3155190.6	371920.3	PIPELINE
M118	148	7/24/98	11:56:51 11:57:00	9.O	25.0 M	3153406.5	370653.9	NONE
M119	149	7/24/98	11:58:29 11:58:32	3.0	25.5 D	3153389.5	370587.4	Correlates with acoustic anomaly A26 (PIPELINE)

Table 1, continued

ANOM #	LINE	DATE	TIME	DURATION (SECONDS)	GAMMA /SIGNATURE	X (NAD 83)	Y (NAD 83)	CORRELATIONS BETWEEN MAGNETIC AND ACOUSTIC ANOMALIES
M120	149	7/24/98	12:01:45 12:02:05	20.0	1343.0 M	3155098.2	371780.6	PIPELINE
M121	150	7/24/98	12:11:08 12:11:37	29.0	1116.0 M	3155120.8	371789.6	PIPELINE
M122	151	7/24/98	12:20:09 12:20:33	24.0	198.0 D	3154990.6	371634.1	PIPELINE
M123	151	7/24/98	12:20:35 12:20:44	9.0	66.5 D	3155149.4	371696.2	TARGET ASSOCIATED WITH PIPELINE
M124	152	7/24/98	12:28:01 12:28:06	5.0	29.5 D	3155347.5	371852.1	NONE
M125	152	7/24/98	12:28:23 12:28:28	5.0	36.0 -	3155183.0	371698.5	NONE
M126	152	7/24/98	12:28:39 12:29:06	27.0	601.5 M	3154944.1	371502.3	NONE
M127	153	7/24/98	12:34:51 12:35:04	13.0	51.0 +	3154343.7	370997.6	NONE
M128	153	7/24/98	12:35:36 12:36:11	35.0	1544.5 M	3154814.4	371330.8	MULTI COMPONENT & PIPELINE
M129	153	7/24/98	12:37:48 12:37:58	10.0	30.5 +	3155749.3	372041.0	NONE
M130	154	7/24/98	12:44:46 12:45:05	19.0	36.0 M	3155185.8	371565.1	NONE
M131	154	7/24/98	12:45:21 12:45:39	18.0	368.5 M	3154869.8	371410.6	Correlates with acoustic anomaly A28 (PIPELINE)
M132	154	7/24/98	12:46:24 12:46:41	17.0	16.5 +	3154389.5	370998.3	NONE
M133	155	7/24/98	12:51:54 12:52:10	16.0	72.5 M	3154607.5	371099.8	NONE
M134	155	7/24/98	12:55:27 12:55:33	6.0	124.0 D	3156355.9	372292.5	NONE
M135	156	7/24/98	13:02:43 13:03:05	22.0	336.5 M	3154601.7	371035.6	PIPELINE
M136	156	7/24/98	13:04:30 13:04:38	8.0	21.0 D	3153811.1	370433.6	NONE
M137	157	7/24/98	13:08:09 13:08:27	18.0	164.0 M	3154416.9	370774.6	PIPELINE
M138	158	7/24/98	13:19:58 13:20:14	16.0	258.5 D	3154417.8	370736.5	PIPELINE
M139	159	7/24/98	13:24:02 13:24:26	24.0	41.5 D	3154053.5	370314.8	NONE
M140	159	7/24/98	13:24:37 13:24:56	19.0	1144.0 D	3154249.7	370534.5	Correlates with acoustic anomaly A30 (PIPELINE)
M141	159	7/24/98	13:27:42 13:27:55	13.0	17.5 M	3155883.9	371732.6	NONE
M142	160	7/24/98	13:47:31 13:47:51	20.0	1014.0 M	3154306.9	370597.2	PIPELINE
M143	161	7/24/98	13:51:20 13:51:41	21.0	135.5 M	3154124.9	370341.6	PIPELINE
M144	162	7/24/98	14:04:17 14:04:38	21.0	1109.5 M	3154091	370292.0	PIPELINE
M145	163	7/24/98	14:06:59 14:07:34	33.0	1258.5 M	3153883.4	370048.2	PIPELINE
M146	163	7/24/98	14:11:23 14:11:31	8.0	26.5 -	3156074.7	371738.0	NONE
M147	164	7/24/98	14:16:11 14:16:15	4.0	20.5 +	3157126.8	372361.1	NONE
M148	164	7/24/98	14:23:16 14:23:40	24.0	1,181.5 M	3153860.8	369988.7	Correlates with acoustic anomaly A36 (PIPELINE)

APPENDIX II

MAGNETIC ANOMALIES FROM SURVEY AREA 2

Table 1. Inventory of Magnetic Anomalies from the Marsh Island Marine Remote Sensing Survey; Survey Area 2.

ANOM #	LINE	DATE	TIME	DURATION (SECONDS)	GAMMA/ SIGNATURE	X (NAD 83)	Y (NAD 83)	CORRELATIONS BETWEEN MAGNETIC AND ACOUSTIC ANOMALIES
M149	1	7/24/98	15:43:23 15:43:44	21.0	26.0 +	3152925.6	385269.6	HISTORIC PILINGS
M150	1	7/24/98	15:47:26 15:47:54	28.0	275.5 D	3153093.8	386773.6	Three pilings on starboard side correlating to acoustic anomaly A37
M151	1	7/24/98	15:48:06 15:48:08	2.0	33.0 -	3153049.7	386914.9	NONE
M152	1	7/24/98	15:48:24 15:48:29	5.0	25.5 -	3152993.3	387034.4	NONE
M153	1	7/24/98	15:49:03 15:49:09	6.0	143.0 D	3153064.5	387260.1	PUMPING STRUCTURE
M154	1	7/24/98	15:49:32 15:49:37	5.0	50.5 +	3153203.2	387355.6	HISTORIC PILINGS
M155	3	7/24/98	16:13:56 16:14:02	6.0	27,225.5 D	3152757.4	385341.2	Correlates with acoustic anomaly A39 (HISTORIC PILINGS & DEBRIS)
M156	3	7/24/98	16:15:22 16:15:47	25.0	877.0 M	3152943.6	385661.1	POSSIBLE PUMPING STRUCTURE
M157	3	7/24/98-	16:21:24 16:21:52	28.0	42.5 D	3152899.7	387110.7	POSSIBLE PUMPING STRUCTURE

APPENDIX III

ACOUSTIC ANOMALIES FROM SURVEY AREA 1

Table 1. Inventory of Acoustic Anomalies From The Marsh Island Marine Remote Sensing Survey; Survey Area 1.

ANOM #	AREA	LINE	DATE	TIME	DISK #/%	OFFSET	DESCRIPTION	CORRELATION BETWEEN ACOUSTIC AND MAGNETIC ANOMALIES
A1	1	4	7/21/98	13:29:24 to 13:29:26	1/1%	42.1 to 43.9 ft port	rectangular anomaly 1.8 ft wide casting a shadow 3.8 ft	NONE
A2	1	22	7/21/98	15:40:39 to 15:40:40	1/26%	19.5 to 21.3 ft port	rectangular anomaly 1.8 ft wide casting a shadow 5.6 ft	NONE
A3	1	41	7/22/98	10:55:59 to 10:56:00	2/30%	54.7 to 57.7 ft port	rectangular anomaly 3.0 ft wide casting a shadow 5.5 ft	NONE
A4	1	42	7/22/98	11:13:12 to 11:13:15	2/37%	29.5 to 36.0 ft port	amorphous area of several small, hard returns 6.5 ft across	NONE
A5	1	53	7/22/98	15:01:52 to 15:02:24	2/99%	5.3 to 61.0 ft starboard	narrow, linear, anomaly transecting starboard side at 45 degree angle	NONE
A6	1	55	7/22/98	15:41:41 to 15:41:43	3/10%	48.6 to 51.2 ft port	crab trap	NONE
A7	1	66	7/22/98	18:25:02 to 18:25:06	3/61%	56.6 to 61.0 ft starboard	crab trap	NONE
A8	1	84	7/23/98	11:59:14 to 11:59:17	4/61%	67.0 to 67.4 ft port/starboard	narrow, linear anomaly crossing survey swath	NONE
A9	1	101	7/23/98	16:15:02 to 16:15:15	5/30%	21.6 to 53.6 ft port	narrow, linear anomaly 32 ft long casting a shadow 1.4 ft	NONE
A10	1	119	7/23/98	18:52:44 to 18:53:26	5/80%	66.7 to 67.1 ft port/starboard	narrow, linear anomaly crossing survey swath(noted on lines 119 through 138)	Correlates with magnetic anomaly M74
A11	1	134	7/24/98	09:50:02 to 09:50:04	6/25%	35.8 to 67.4 ft starboard	oblong area of small acoustic anomalies with a length of 31.6 ft	Correlates with magnetic anomaly M94
A12	1	139	7/24/98	10:27:09 to 10:27:55	6/38%	66.5 to 64.2 ft port/starboard	linear area of bottom surface disturbance	Correlates with magnetic anomaly M102
A13	1	140	7/24/98	10:35:57 to 10:36:24	6/42%	55.9 to 66.6 ft port/starboard	narrow, linear anomaly crossing survey swath	NONE
A14	1	141	7/24/98	10:44:57 to 10:45:18	6/44%	65.3 to 67.4 ft port/starboard	narrow, linear anomaly crossing survey swath	NONE
A15	1	141	7/24/98	10:47:38 to 10:48:00	6/45%	12.2 to 67.3 ft port	narrow, linear anomaly 55.1 ft long	NONE
A16	1	141	7/24/98	10:49:36 to 10:50:04	6/45%	57.7 to 66.8 ft port/starboard	narrow, linear anomaly crossing survey swath	NONE
A17	1	142	7/24/98	10:53:18 to 10:53:33	6/47%	8.4 to 67.3 ft port	linear area of bottom surface disturbance 58.9 ft in length	NONE
A18	1	143	7/24/98	11:10:36 to 11:11:32	6/51%	67.3 to 67.4 ft port/starboard	narrow, linear anomaly crossing survey swath	NONE
A19	1	144	7/24/98	11:20:59 to 11:22:07	6/55%	67.3 to 36.4 ft port/starboard	linear area of bottom surface disturbance crossing survey swath	Correlates with magnetic anomaly M109
A20	1	144	7/24/98	11:23:05 to 11:23:51	6/56%	67.3 to 67.4 ft port/starboard	narrow, linear anomaly crossing survey swath	NONE
A21	1	145	7/24/98	11:29:51 to 11:30:18	6/58%	67.3 to 67.4 ft port/starboard	narrow, linear anomaly crossing survey swath	Correlates with magnetic anomaly M111
A22	1	146	7/24/98	11:35:22 to 11:35:41	6/60%	50.3 to 38.7 ft port/starboard	very narrow, linear anomaly crossing survey swath	Correlates with magnetic anomaly M113

Table 1, continued

ANOM #	AREA	LINE	DATE	TIME	DISK #/%	OFFSET	DESCRIPTION	CORRELATION BETWEEN ACOUSTIC AND MAGNETIC ANOMALIES
A23	1	147	7/24/98	11:42:31 to 11:43:43	6/62%	67.3 to 62.4 ft port/starboard	amorphous, linear area of acoustic disturbance crossing survey swath	Correlates with magnetic anomaly M115
A24	1	147	7/24/98	11:47:04 to 11:47:16	6/64%	12.3 to 67.4 ft starboard	narrow, linear anomaly 55.1 ft in length	Correlates with magnetic anomaly M116
A25	1	148	7/24/98	11:51:10 to 11:51:43	6/66%	67.3 to 67.4 ft port/starboard	faint, narrow, linear anomaly crossing survey swath	NONE
A26	1	149	7/24/98	11:58:24 to 11:58:44	6/68%	67.3 to 67.3 ft port/starboard	clearly visible, narrow, linear anomaly crossing survey swath	Correlates with magnetic anomaly M119
A27	1	153	7/2498	12:33:35 to 12:33:55	6/79%	43.0 ft port	narrow, linear anomaly bending along port side of survey swath	NONE
A28	1	154	7/24/98	12:45:22 to 12:4555	6/84%	38.6 to 42.2 ft port/starboard	narrow, linear anomaly crossing survey swath	Correlates with magnetic anomaly M131
A29	1	158	7/24/98	13:17:28 to 13:17:57	6/94%	67.3 to 42.2ft port/starboard	very narrow linear area of scattered small targets 25.1 ft in length	NONE
A30	1	159	7/24/98	13:24:29 to 13:24:45	6/97%	Continuous starboard channel	narrow, linear anomaly crossing starboard side of survey swath and centerline	Correlates with magnetic anomaly M140
A31	1	160	7/24/98	13:44:58 to 13:45:24	3/78%	67.3 to 64.2 ft port/starboard	straight, linear anomaly crossing survey swath	NONE
A32	1	161	7/24/98	13:53:47 to 13:54:26	3/81%	67.3 to 64.2 ft port/starboard	narrow, linear anomaly crossing survey swath	NONE
A33	1	162	7/24/98	14:01:40 to 14:01:57	3/84%	67.3 to 63.9 ft port/starboard	faint, narrow, linear anomaly crossing survey swath	NONE
A34	1	163	7/24/98	14:09:35 to 14:10:01	3/86%	67.3 to 44.0 ft port/starboard	faint, narrow linear anomaly crossing centerline	NONE
A35	1	164	7/24/98	14:22:03 to 14:22:12	3/90%	28.3 to 65.3 ft port	faint, linear anomaly	NONE
A36	1	164	7/24/98	14:23:10 to 14:23:13	3/90%	22.8 to 29.3 ft port/starboard	narrow, linear anomaly 52.1 ft long crossing centerline casting small shadow	Correlates with magnetic anomaly M148

APPENDIX IV

ACOUSTIC ANOMALIES FROM SURVEY AREA 2

Table 1. Inventory of Acoustic Anomalies from the Marsh Island Marine Remote Sensing Survey; Survey Area 2.

ANOM #	AREA	LINE	DATE	TIME	DISK #/%	OFFSET	DESCRIPTION	CORRELATIONS BETWEEN ACOUSTIC AND MAGNETIC ANOMALIES
A37	2	1	7/24/98	15:47:23 to 15:47:33	3/92%	42.0 ft starboard	three pilings on starboard side	Correlates with magnetic anomaly M150
A38	2	1	7/24/98	15:48:06	3/93%	46.0 ft starboard	unidentified debris	NONE
A39	2	3	7/24/98	16:13:50	3/97%	22.0 ft port	Dock pilings and debris	Correlates with magnetic anomaly M155

APPENDIX V

SCOPE OF SERVICES

CEMVN-PD-RN May 20, 1998

SCOPE OF SERVICES
Contract DACW29-97-D-0018

CULTURAL RESOURCES INVESTIGATIONS FOR
THE MARSH ISLAND HYDROLOGIC RESTORATION PROJECT (TV-5/7)
IBERIA PARISH, LOUISIANA

1. Introduction

This task order calls for a remote sensing survey for underwater cultural resources, coupled with a bankline survey of selected areas to be impacted by construction of the Marsh Island Hydrologic Restoration Project, Iberia Parish, Louisiana. The U.S. Army Corps of Engineers, New Orleans District (NOD) plans to stabilize the northeast shoreline of Marsh Island to protect the interior marshes from wave attack generated in West Cote Blanche Bay. The project includes plans to plug existing oil well access canals to decrease tidal exchange on the island. A fact sheet describing the project and a map showing the location of work is provided as Attachments 1 and 2. The contract period for this task order is 30 weeks.

2. Project Area

The project area is located on Marsh Island and its adjacent waters. Nine existing oil well access canal closure sites, a 1,000-foot by 3,000-foot cell closure located on the north shoreline of Lake Sands, and an approximately 45-foot-wide by 2,000-foot-long section of shoreline located on the northeast portion of the island are included in the project area. An area of open water on the south side of the island has been designated as a source for borrow material. The portions of the project area to be investigated as part of this task order are described in more detail in Section 5.b. below.

3. Background Information

A discussion of the distribution of prehistoric cultural resources located on Marsh Island was presented by Brown (1979). An inventory of shipwrecks and other waterborne resources located in the vicinity of the project area was completed by Pearson, et al. (1989). A study on the history and occurrence of maritime resources in the region including the present project area was recently completed by Birchett et al. (1998). The studies provide a framework for addressing cultural resources concerns in the project area.

The project area is within the Russell Sage Foundation State Wildlife Refuge and Game Preserve. The refuge is maintained by Louisiana's Department of Wildlife and Fisheries (LDWF). As part

of NOD's agreement with LDWF, conditions governing rights-of-entry will be followed when conducting fieldwork on the island. The conditions for right-of entry are provided as Attachment 3. Any problems encountered in meeting these requirements are to be brought to the COR's immediate attention.

4. General Nature of the Work

The fieldwork will include both terrestrial and underwater survey methods to identify and record prehistoric and/or historic sites, shipwrecks, or other cultural resources which may exist in the project area. Terrestrial investigations are to include pedestrian bankline survey supplemented with the systematic excavation of shovel and/or auger tests. The underwater investigations will include a systematic magnetometer, side-scan sonar, and bathymetric survey using precise navigation control. All magnetic and sonar anomalies will be interpreted based on expectations of the character of shipwreck signatures. No diving will be performed under this task order.

5. Study Requirements

The study will be conducted utilizing current professional standards and guidelines including, but not limited to:

- the National Park Service's National Register Bulletin 15 entitled "How to Apply the National Register Criteria for Evaluation";
- the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation as published in the Federal Register on September 29, 1983;
- Louisiana's Comprehensive Archaeological Plan, dated October 1, 1983;
- The Advisory Council on Historic Preservation's regulation 36 CFR Part 800 entitled, "Protection of Historic Properties";
- the Louisiana Submerged Cultural Resource Management Plan published by the Division of Archaeology in 1990.

The study will be conducted in three phases: Review of Background Sources, Fieldwork, and Data Analyses and Report Preparation.

a. Phase 1: Literature Search and Records Review. The Contractor shall commence, upon work item award, with a literature, map, and records review specific to the study area. This phase shall include a review and synthesis of the archeological, historical and geomorphologic reports covering the study area. The National Register of Historic Places and the State Archeologist's site, standing structure and shipwreck

database files will be consulted to establish a current and complete distribution of historic properties in the vicinity of the study area. At a minimum, the background research and records review will be sufficient for developing the historic context of the study area and should be to a level sufficient for assessing the significance of any sites recorded as a result of the Phase 2 investigations. A detailed chain of title for the study area is not required for this study.

b. Phase 2: Fieldwork. Upon completion of Phase 1, the contractor shall proceed with execution of the phase 2 fieldwork. Phase 2 will entail both terrestrial and underwater survey; the investigations are to be conducted concurrently.

The pedestrian bankline survey will be conducted within a 50-foot-wide by approximately 2,000-foot-long segment of the shoreline of Marsh Island extending from Hawkins Bayou on the west to East Pass (Attachment 1). Shovel/auger tests in this area are to be excavated at intervals not to exceed 50 meters. Additional shovel and/or auger tests will be excavated to further define site boundaries. In addition, a minimum of two shovel/auger tests are to be excavated within 15 meters of either side of each planned canal closure (Canals 1 through 9). Maps showing the location of each shovel/auger test along with the project boundaries and other project features are to be drawn to scale and included in the management summary and the draft and final reports.

The underwater survey is to be conducted in near shore conditions in the planned borrow area located in East Cote Blanche Bay. The coordinates (NAD 1927) marking the corners of the borrow area are the following:

1) x=1875438.86, y=319712.99
2) x=1880111.88, y=313221.47
3) x=1873560.53, y=308505.39
4) x=1868516.78, y=315511.93

The equipment array required for the remote sensing portion of the fieldwork will include:

(1) a marine magnetometer
(2) a positioning system
(3) a side-scan sonar system
(4) a fathometer

The following requirements apply to the underwater survey:

(1) transect lane spacing will be no more than 100 feet;
(2) positioning control points will be obtained at least every 100 feet along transects;

(4) background noise will not exceed +/- 3 gammas;

(5) magnetic data will be recorded on 100-gamma scale;

(6) the magnetometer sensor will be towed a minimum of 2.5 times the length of the boat or projected in front of the survey vessel to avoid noise from the survey vessel;

(7) the survey will utilize the Louisiana State Plane Coordinate System (NAD 1983); and

(8) additional, more tightly spaced, transects will be run over all potentially significant anomalies.

Flotation access may be required along Hawkins Bayou to construct the interior closures. Historic maps depict a structure located on the west bank of Hawkins Bayou in a bend in the bayou below Canal No. 6. A combination of terrestrial and underwater survey methods are to be employed to determine the nature and extent of material at this location. If evidence of a site persists, the site will be mapped, photographed, and plotted on the appropriate USGS 7.5-foot series topographic quadrangle. Sonar images or magnetic data derived from remote survey methods will be correlated to terrestrial survey information and incorporated into the site descriptions. A map derived from compass and tape survey control will be acceptable for documenting this effort.

c. Phase 3: Data Analyses and Report Preparation. All data collected in conjunction with this investigation will be analyzed using currently acceptable scientific methods and will be conducted in accordance with the contractor's proposal. The post-survey data analyses and report presentation covering the underwater survey results will include as a minimum:

(1) post-plots of survey transects and data points;

(2) same as above with magnetic data included;

(3) plan views of all potentially significant anomalies showing transects, data points and contours; and

(4) correlation of magnetic, sonar, and fathometer data, where appropriate.

The interpretation of identified magnetic anomalies will rely on expectations of the character (i.e., signature) of shipwreck magnetics derived from the available literature. Interpretation of anomalies will also consider probable post-depositional impacts and the potential for natural and modern, i.e., insignificant, sources of anomalies. The Contractor will file state site forms with the Louisiana State Archeologist and cite the resulting state-assigned site numbers in all draft and final reports for any anomaly classified as a site.

For coordination purposes, a management summary shall be submitted in advance of the draft and final reports of the investigations. The schedule and guidelines for submitting the management summary are discussed in Section 6.a. below.

The draft and final reports will present the results and recommendations for terrestrial and underwater investigations. An inventory of all anomalies recorded during the underwater survey, with recommendations for further identification and evaluation procedures will be included as appropriate. The discussions must include justifications for the selection of specific targets for further evaluation. The potential for each target or submerged historic property to contribute to archeological or historical knowledge will be assessed. Thus, the Contractor will classify each anomaly as either potentially eligible for inclusion in the National Register, or not eligible. Sonar images of potentially significant anomalies should be referenced and included in the report.

The contractor shall fully support his recommendations regarding site significance. The report will include a summary table listing all anomalies. At a minimum, the table will include the following information: project name; survey segment/area; magnetic target number; gammas intensity; target coordinates, target size, association, description of sonar data.

Reports are to include an assessment of potential significance and recommendations for further work. Recommendations for equipment and methodology to be employed in future evaluation studies must be discussed in detail. Additional requirements for the management summary, draft, and final reports are contained in Section 6 of this Scope of Services.

6. Reports

a. Management Summary. Three copies of a management summary which presents the results of the fieldwork will be submitted to the COR within 2 weeks of completion of the fieldwork (8 weeks after award). The report will include discussions, with tables and map illustrations for all terrestrial and underwater site investigations. Guidelines on preparing the management summary are provided as Attachment 4.

Recommendations for further identification and evaluation procedures will be included when appropriate. A map showing, as a minimum, post-plots for track lines, magnetic contours showing contour intervals, fathometric contours, and appropriate project related information used to identify anomaly boundaries and project impacts to potentially significant anomalies will be included.

The COR will review the management summary and provide comments to the contractor within 1 week after the receipt of the management summary. The Contractor shall address the comments and

corrections before submitting 4 copies of the final management summary (8 weeks after award).

b. Draft and Final Reports Five copies of a draft report integrating all phases of this investigation will be submitted to the COR for review and comment within 16 weeks after the date of the award. Completed state site forms will be submitted under separate cover at the same time as the draft report. The final report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8-1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 6 weeks after receipt of the draft reports (22 weeks after date of order). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR within 4 weeks (26 weeks after date of order). Upon approval of the preliminary final report by the COR, the Contractor will submit 1 reproducible master copy, 1 copy on floppy diskette, 35 copies of the final report, and all separate appendices to the COR within 30 weeks after date of order. A copy of the Scope of Services shall be bound as an appendix with the Final Report. The Contractor shall also supply a complete listing of all computer files submitted. This listing will include file names, file types, disk number, and file description.

7. Weather Contingencies

The potential for weather-related delays during the underwater survey necessitates provision of one weather contingency day in the task order. If the Contractor experiences unusual weather conditions, he will be allowed additional time on the delivery schedule but no cost adjustment. Weather contingencies do not apply to the terrestrial investigations.

8. References

Brown, Ian
1979 Certain Coastal Settlement Pattern Changes in the Petite Anse Region of Southwest Louisiana Peabody Museum Harvard University, Cambridge, MA.

Pearson, Charles E., George J.Castille, Donald Davis, Thomas E. Redard, and Allen R. Saltus
1989 A History of Waterborne Commerce and Transportation within the U.S. Army Corps of Engineers, New Orleans District and an Inventory of Known Underwater Cultural Resources. Submitted to U.S. Army Corps of Engineers, New Orleans District.

Birchett, Tommy Charles E. Pearson, and George J.Castille
1998 Historic Navigation and Shipwreck Study, Lower Atchafalaya Basin Re-Evaluation Study, South Central Louisiana. Draft Report Submitted to U.S. Army Corps of Engineers, New Orleans District.

9. Attachments

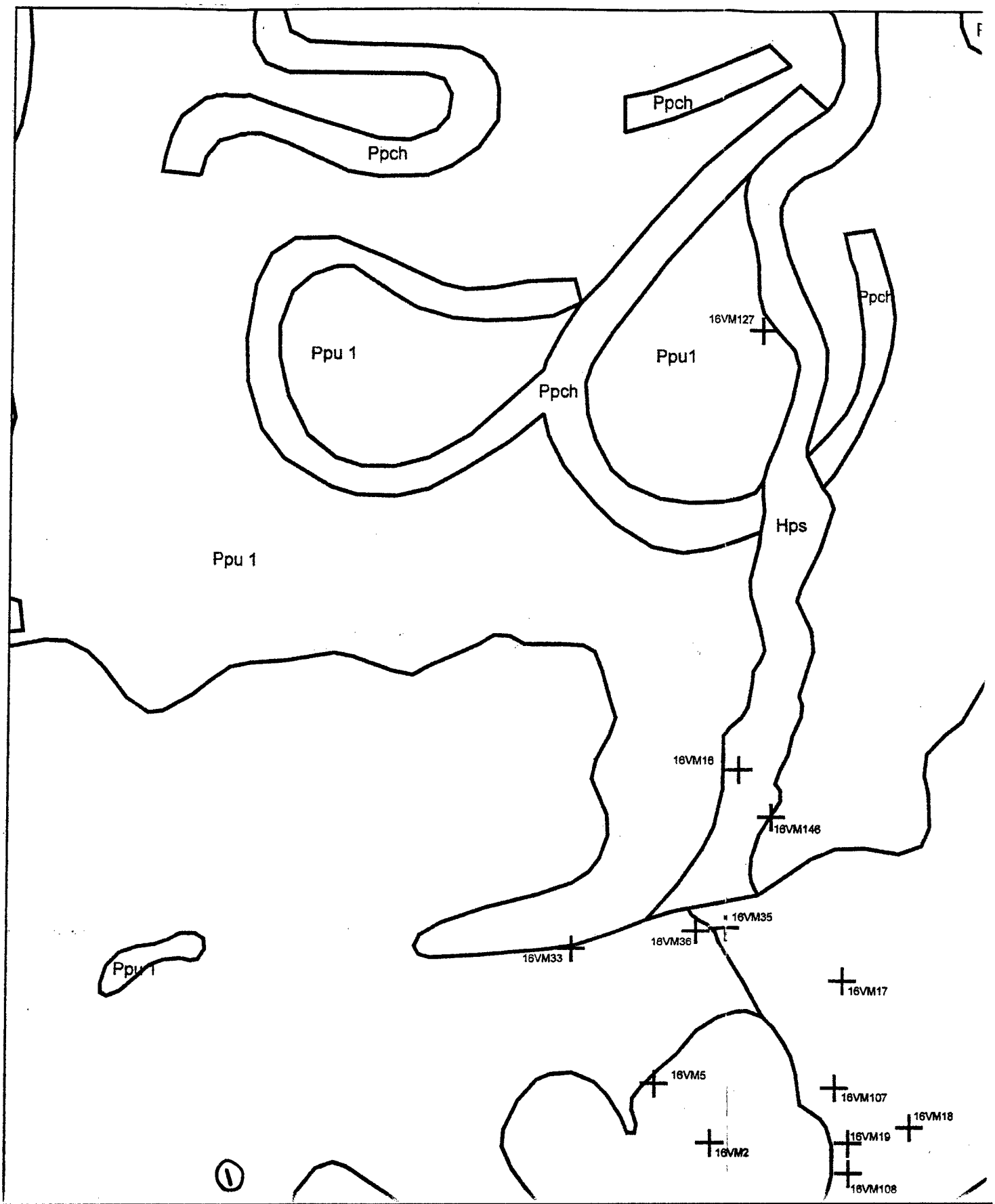
Attachment 1. Map showing the study area

Attachment 2. Project fact sheet

Attachment 3. Provisions covering rights-of-entry

Attachment 4. Management summary guidelines

Figure 19. **Excerpt from the 1994-1995 digital 7.5 minute series topographic quadrangles Bayou Blanc, Ba Centerville, Cheniere Au Tiger, Cypremort Point, Ellerslie, Fearman Lake, Franklin, Hammock I Herbert Lake, Intracoastal City, Kemper, Lake Point, Marone Point, Mound Point, North Bend, P Point, Tigre Lagoon, and Weeks, Louisiana, showing site locations within the Marsh Island Hydrolo area, as well as site locations within an 8.0 km (5 mi) radius from the coastline.**



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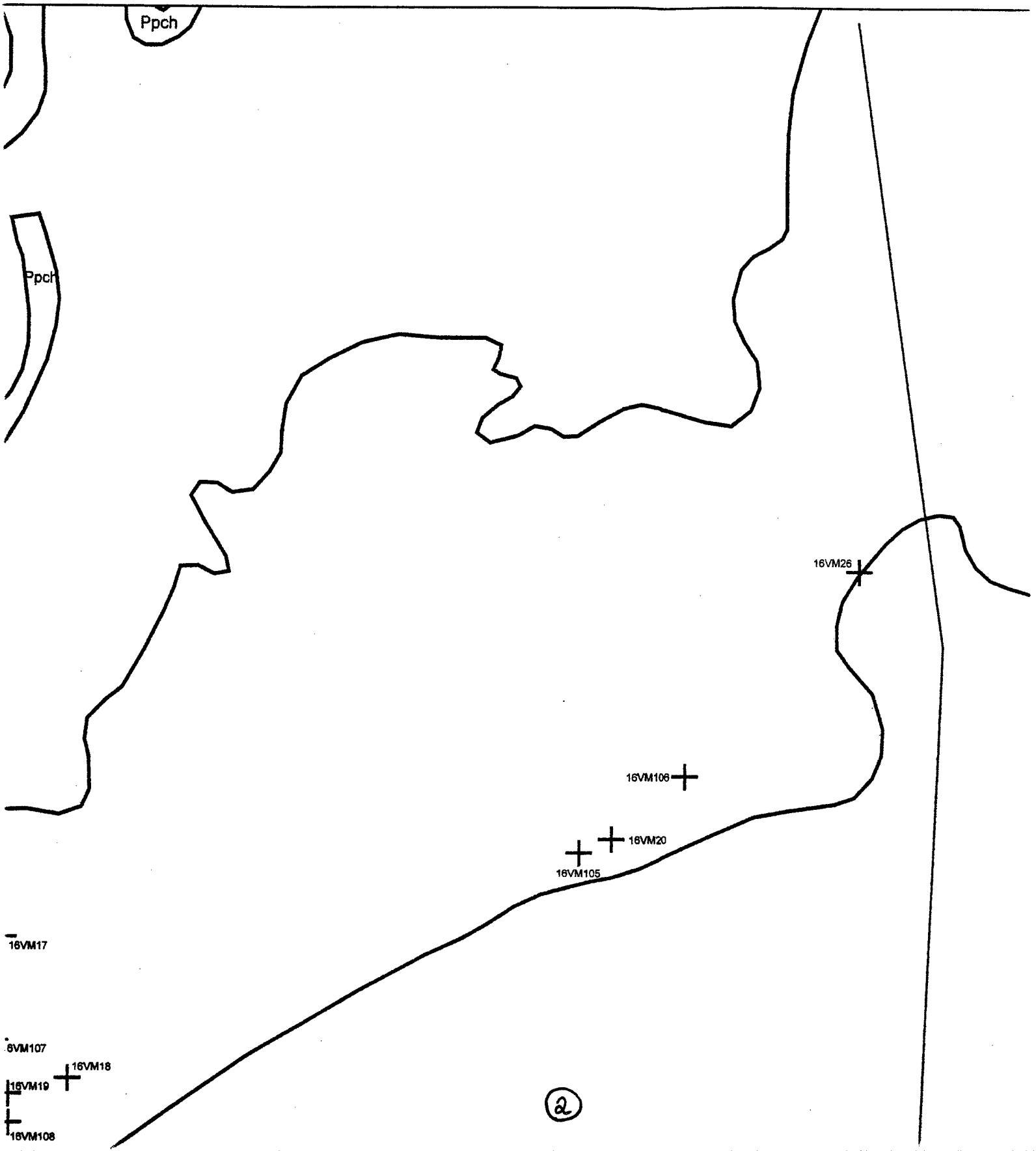
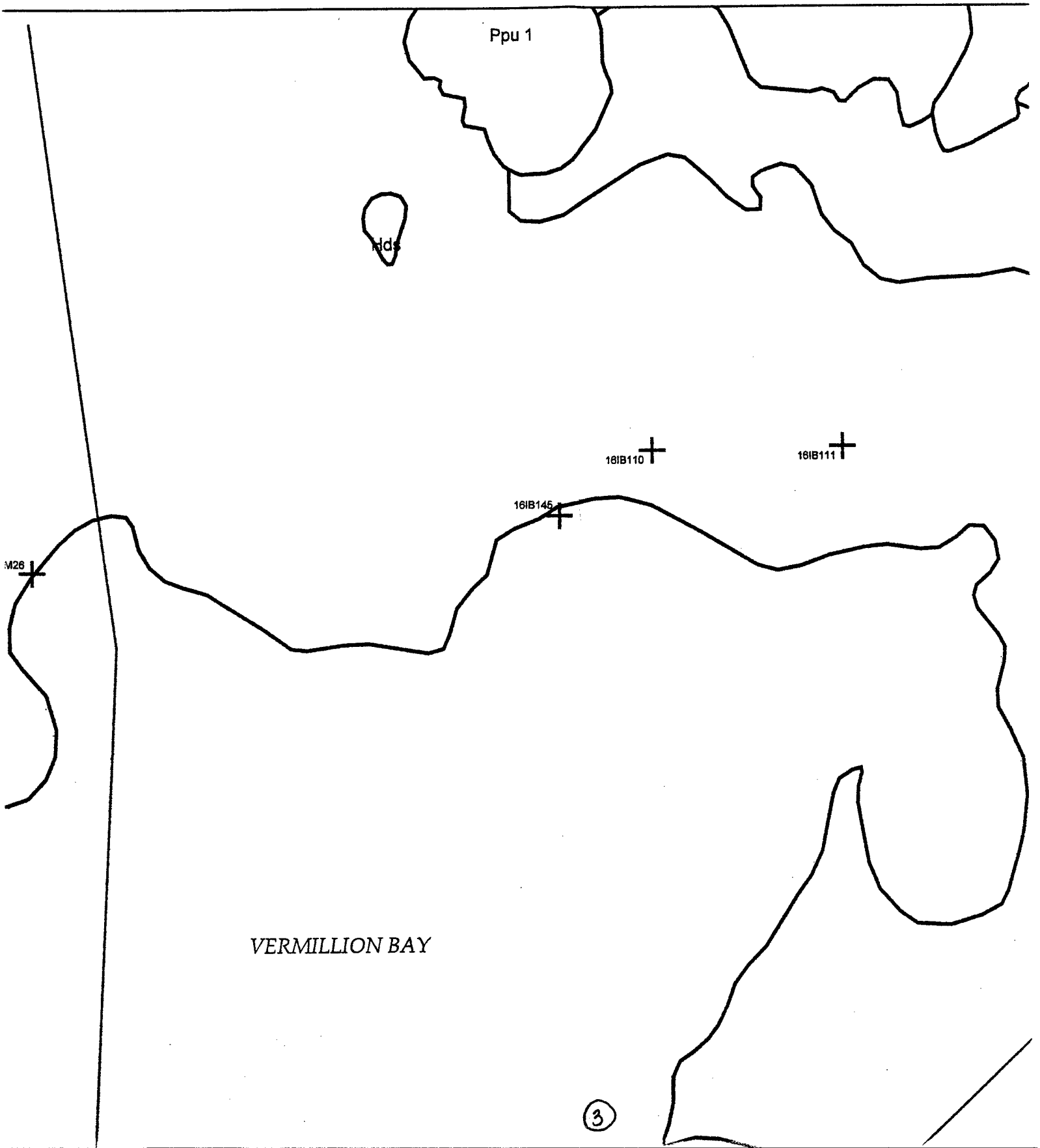
ıt, North Bend, Point Chevreuil, Redfish
sh Island Hydrologic Restoration project

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Ppch
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Hdi
16IB3
16IB102
16IB146
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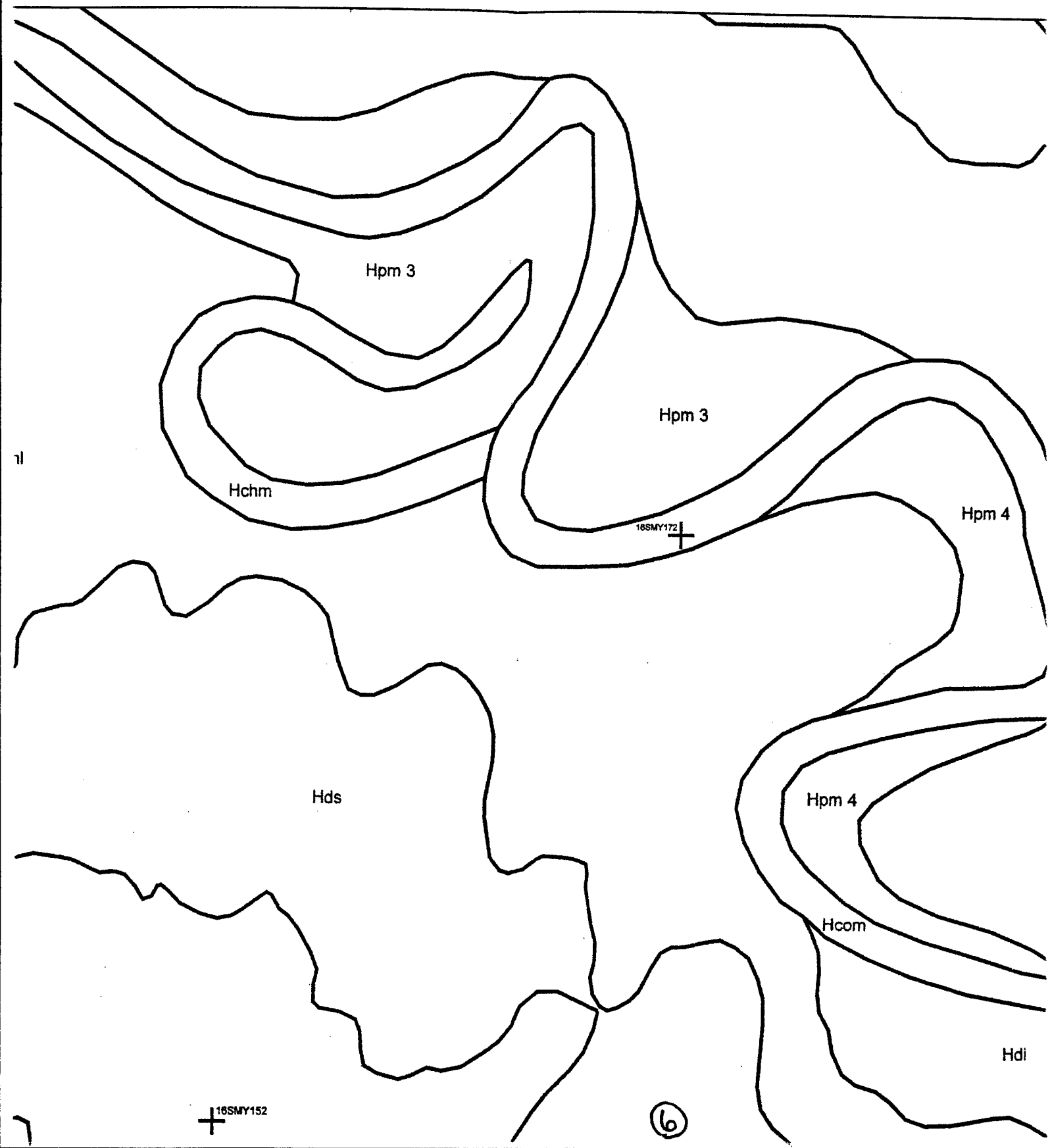
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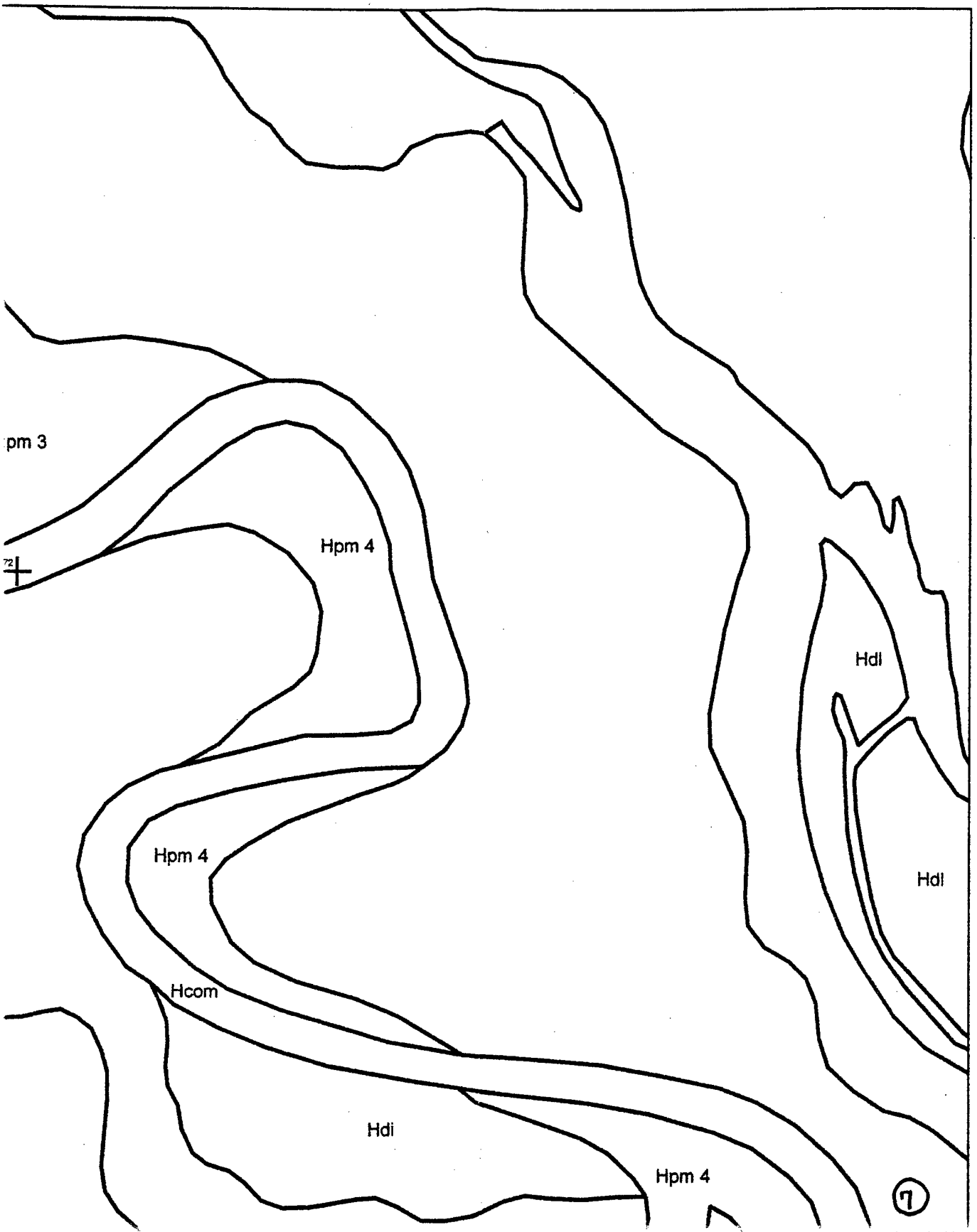
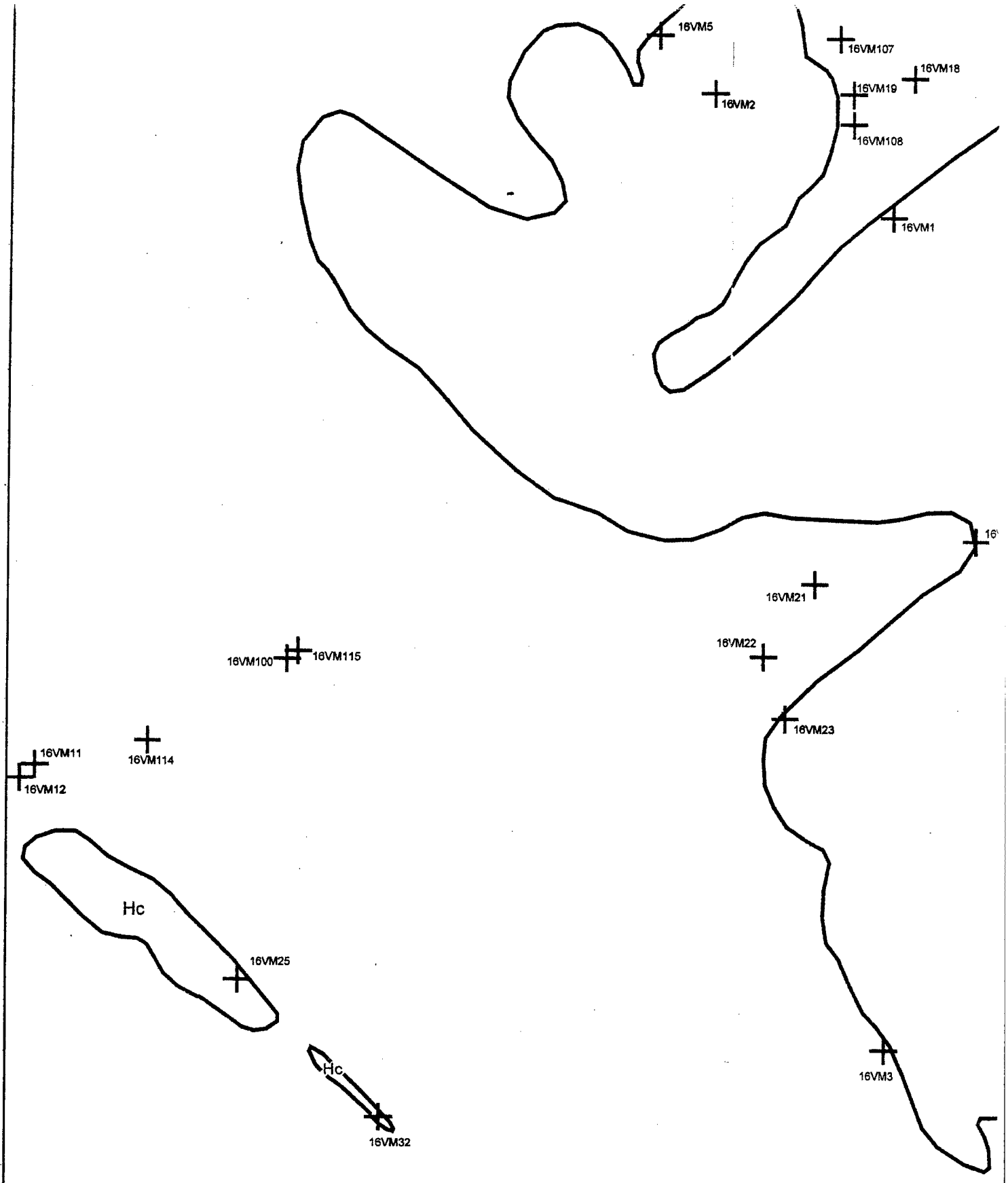

pm 3
Hpm 4
Hdl
Hpm 4
Hdl
Hcom
Hdi
Hpm 4
7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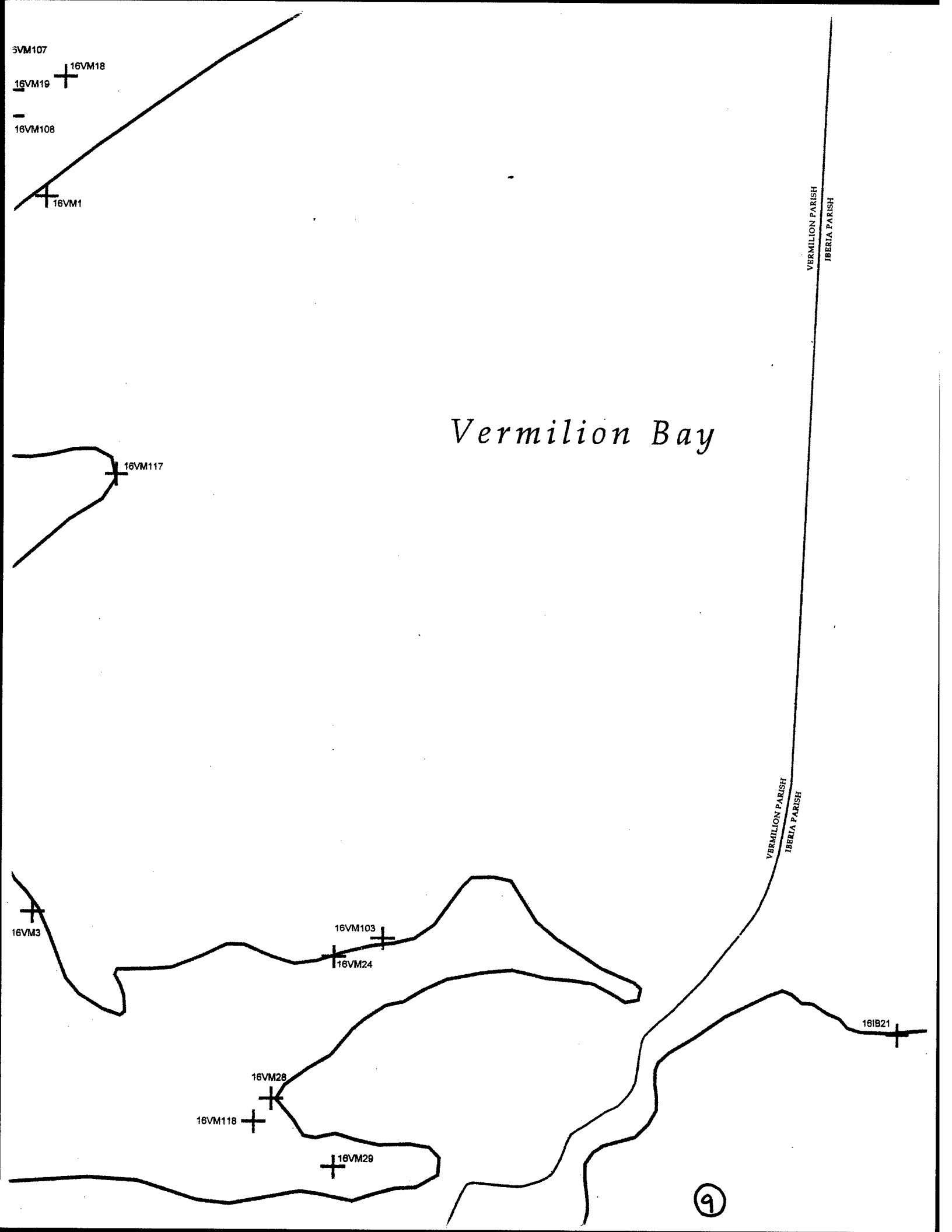
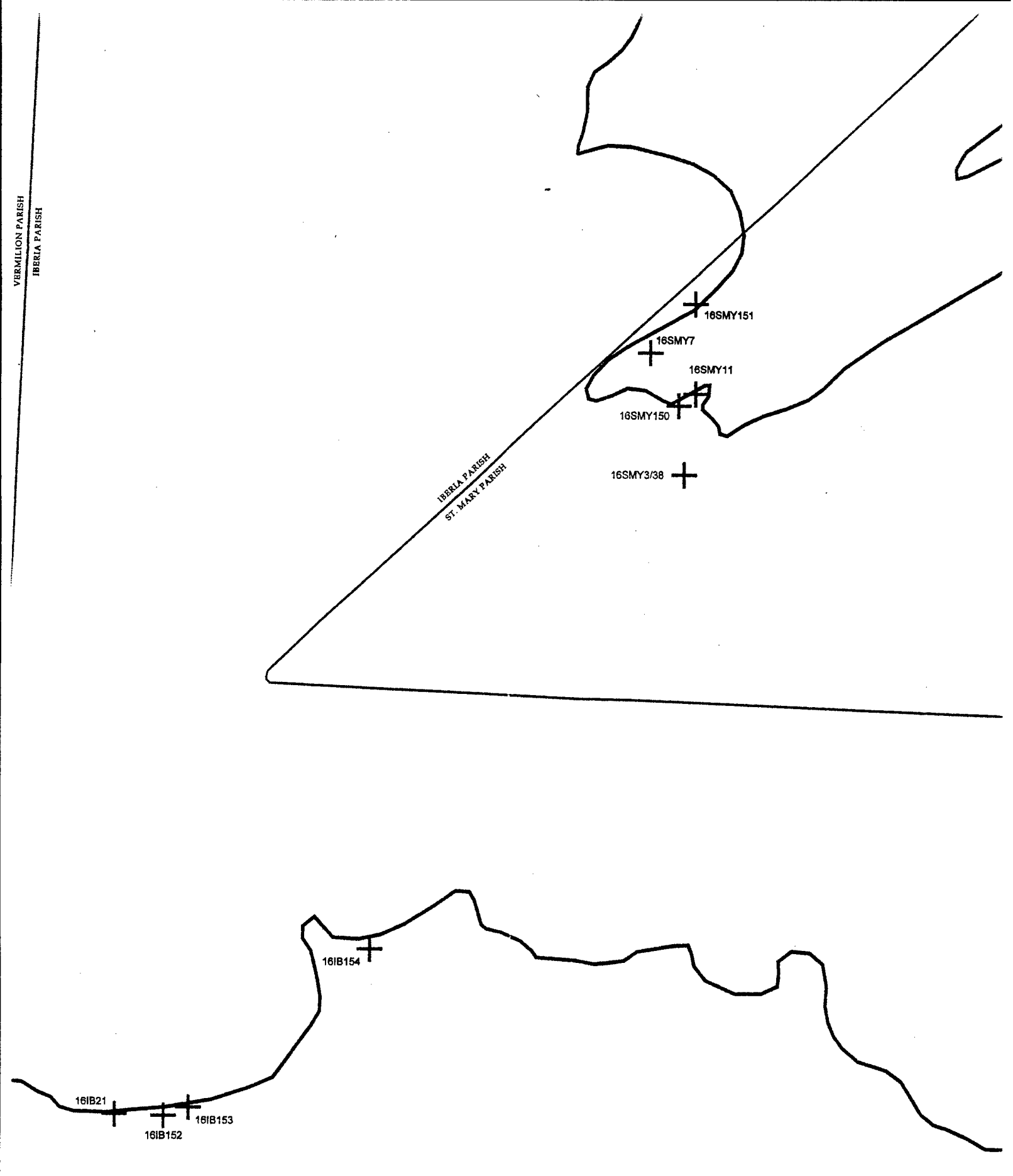
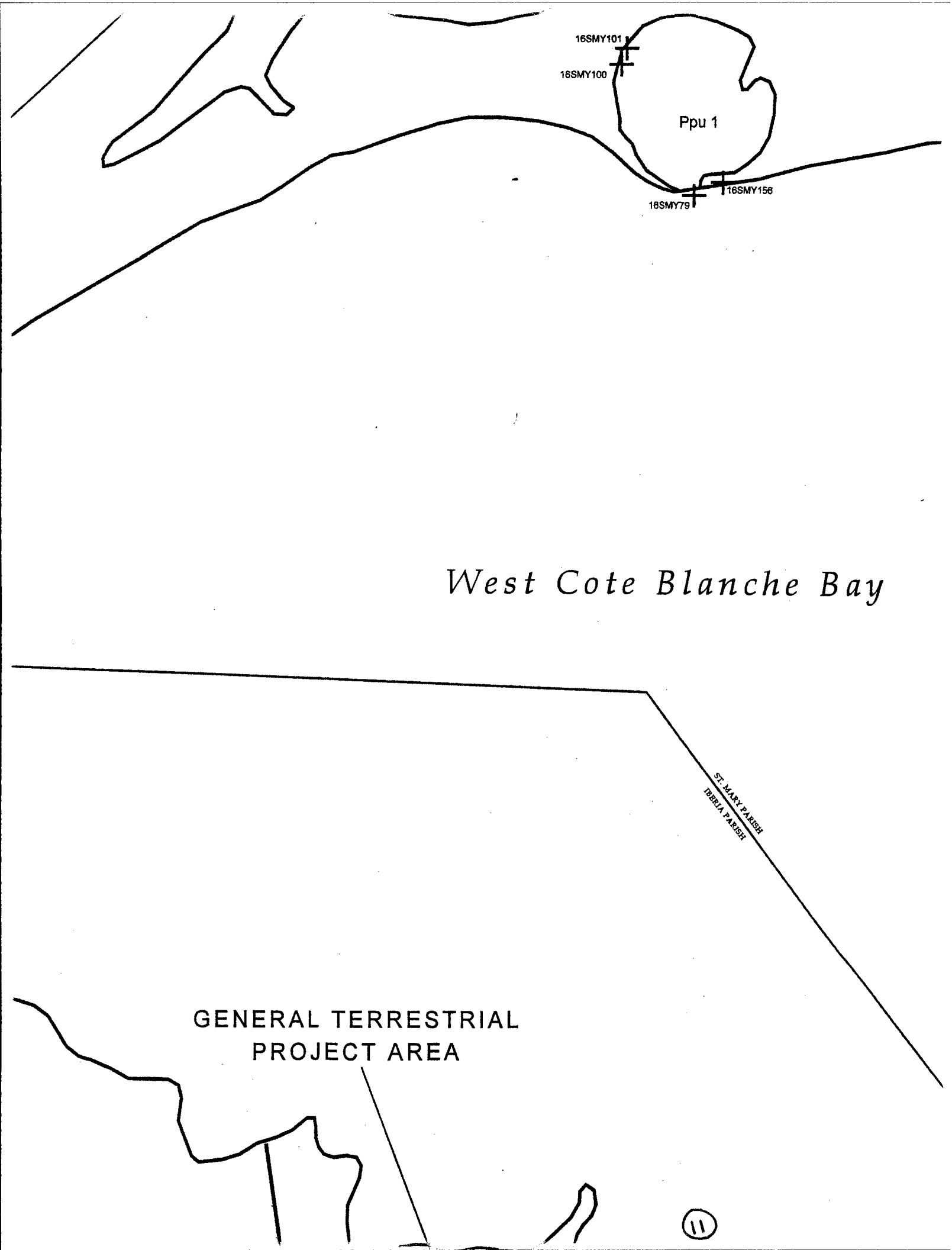
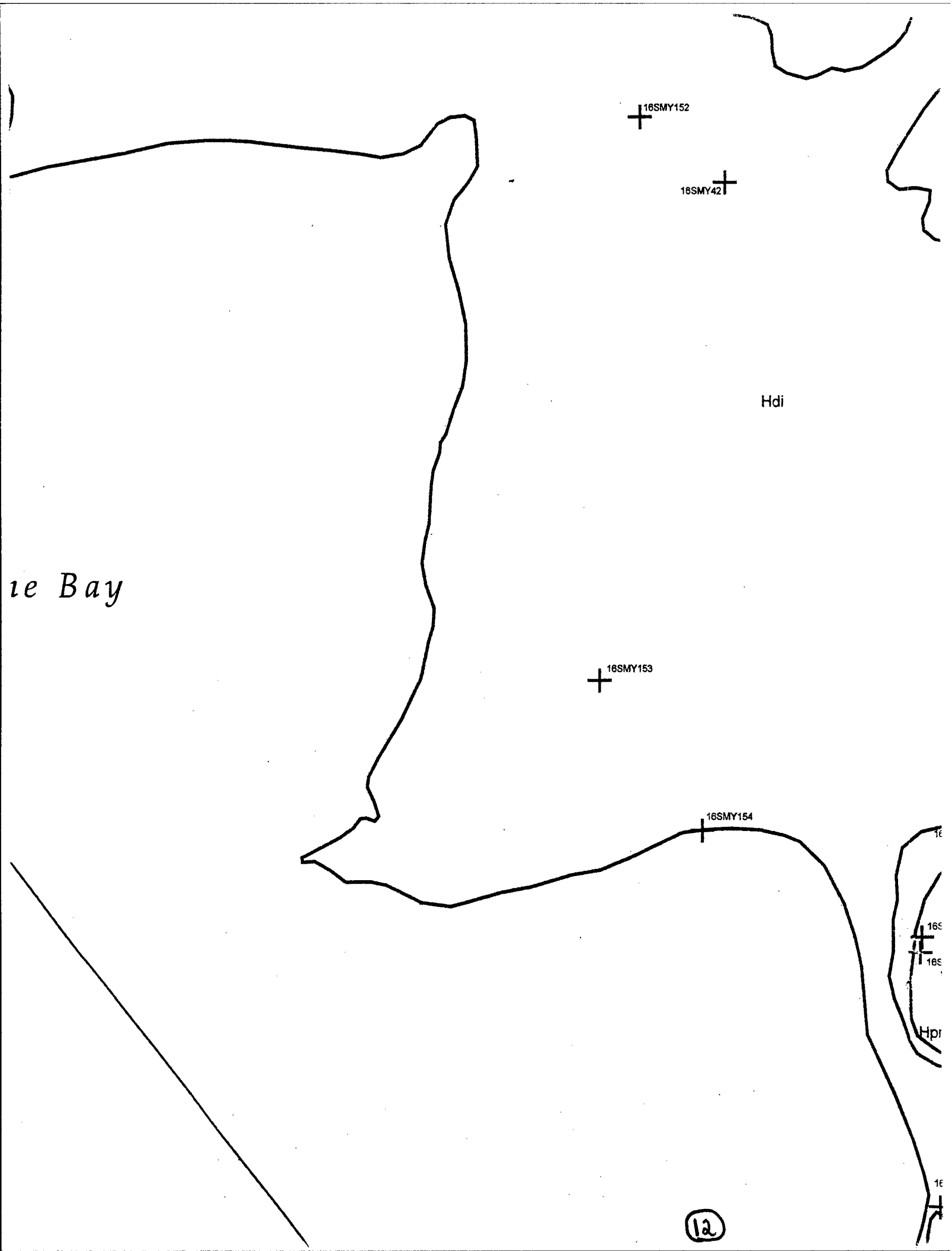
16VM107
16VM18
16VM19
16VM2
16VM108
16VM1
16VM21
16VM22
16VM100
16VM115
16VM23
16VM11
16VM114
16VM12
Hc
16VM25
Hc
16VM3
16VM32


3VM107
16VM18
16VM19
16VM108
16VM1
VERMILION PARISH
IBERIA PARISH
Vermilion Bay
16VM117
VERMILION PARISH
IBERIA PARISH
16VM3
16VM103
16VM24
16IB21
16VM28
16VM118
16VM29


VERMILION PARISH
IBERIA PARISH
16SMY151
16SMY7
16SMY11
16SMY150
16SMY3/38
IBERIA PARISH
ST. MARY PARISH
16IB154
16IB21
16IB153
16IB152


16SMY101
16SMY100
Ppu 1
16SMY156
16SMY79
West Cote Blanche Bay
ST. MARY PARISH
IBERIA PARISH
GENERAL TERRESTRIAL
PROJECT AREA
11


16SMY152
16SMY42
Hdi
ıe Bay
16SMY153
16SMY154
Hpr


Hdi
Hpm
SMY42
Hdi
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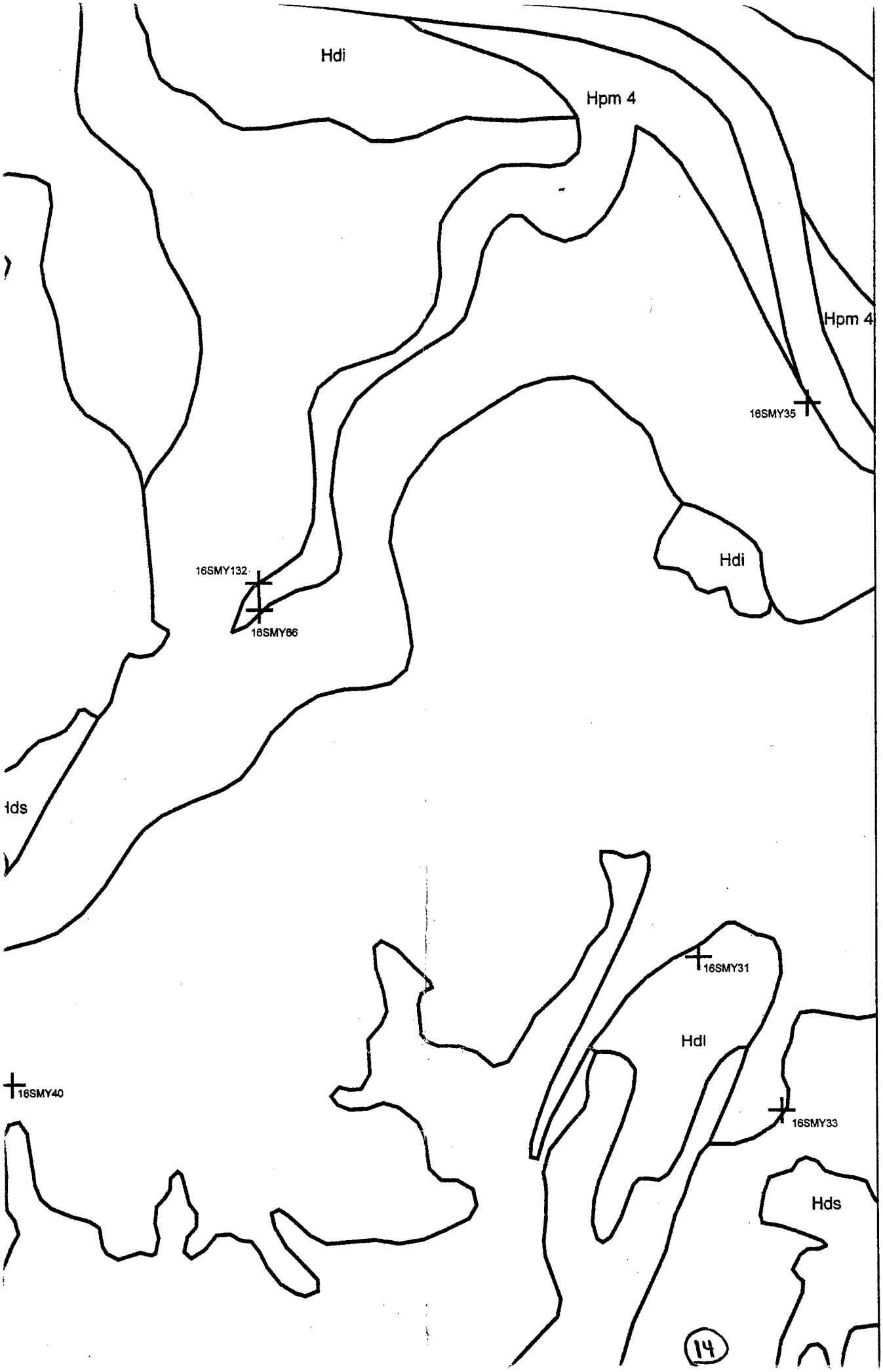
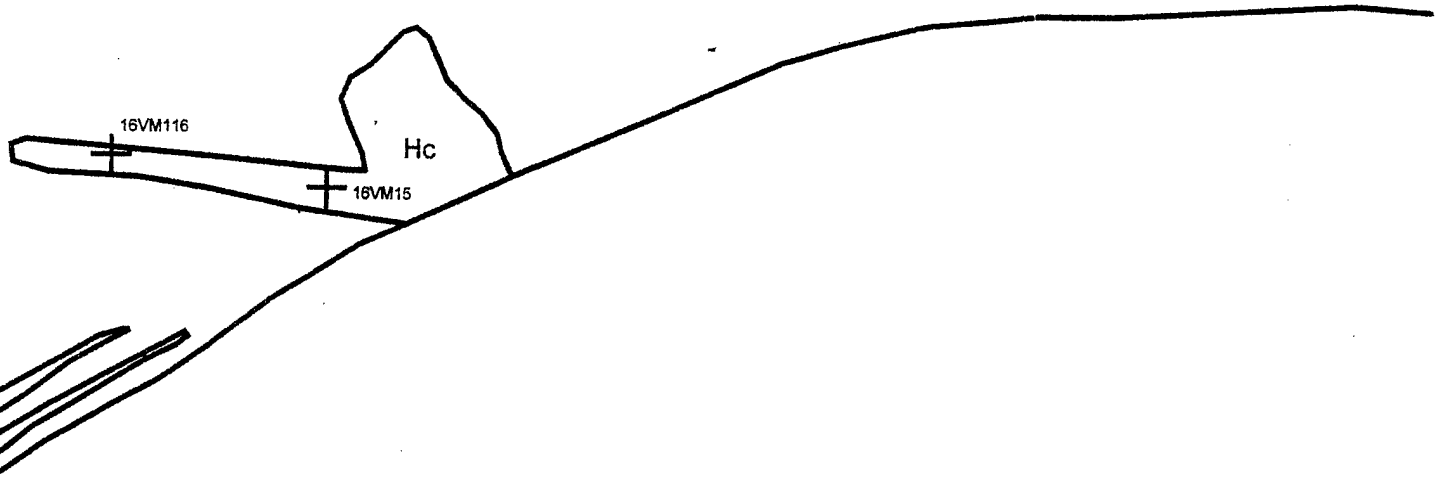
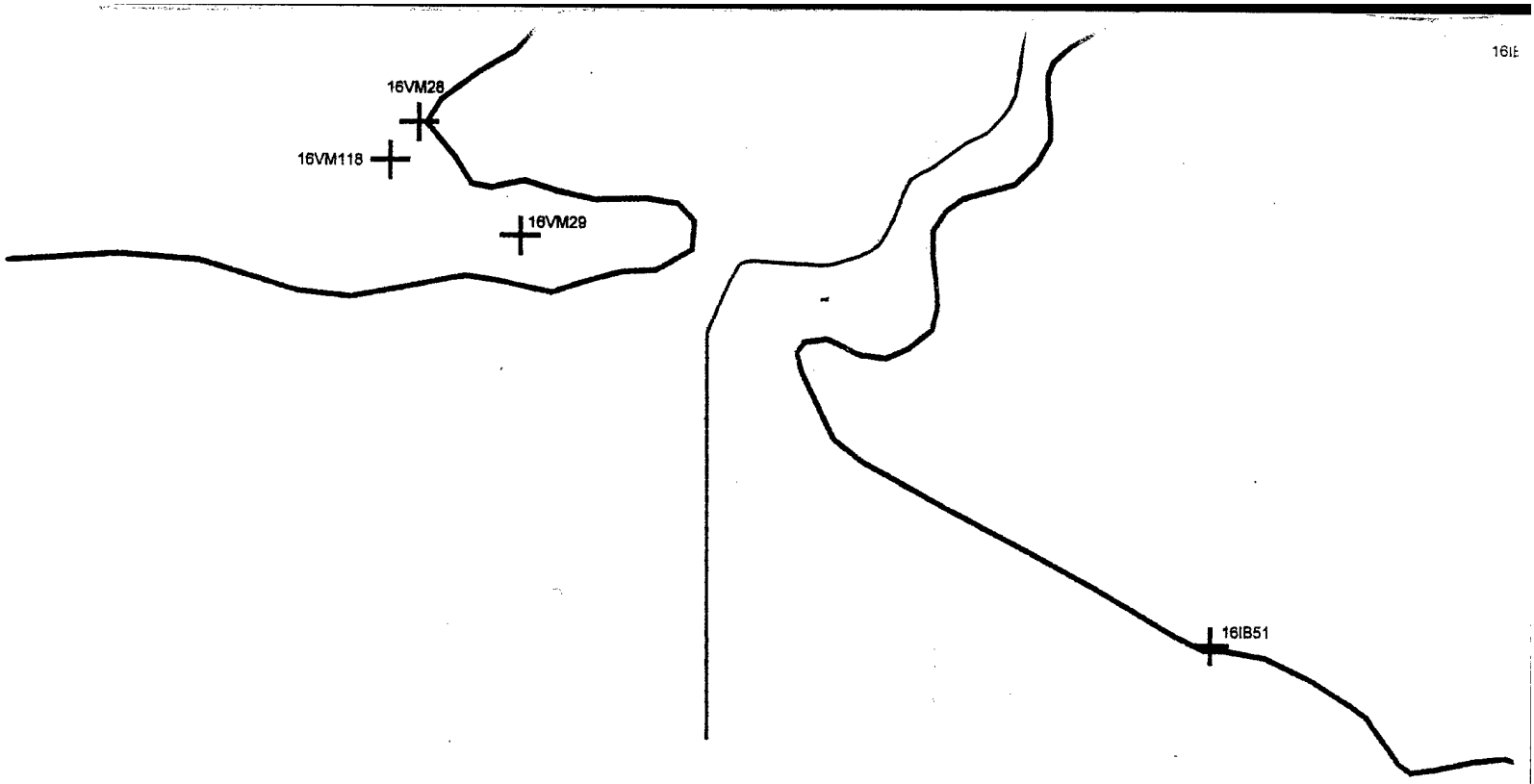
16SMY66
Hds
16SMY154
16SMY159
16SMY158
16SMY157
16SMY40
Hpm 4
16SMY156


Hdi
Hpm 4
Hpm 4
16SMY35
16SMY132
16SMY66
Hdi
Ids
16SMY31
Hdl
16SMY40
16SMY33
Hds


16VM116
Hc
16VM15


N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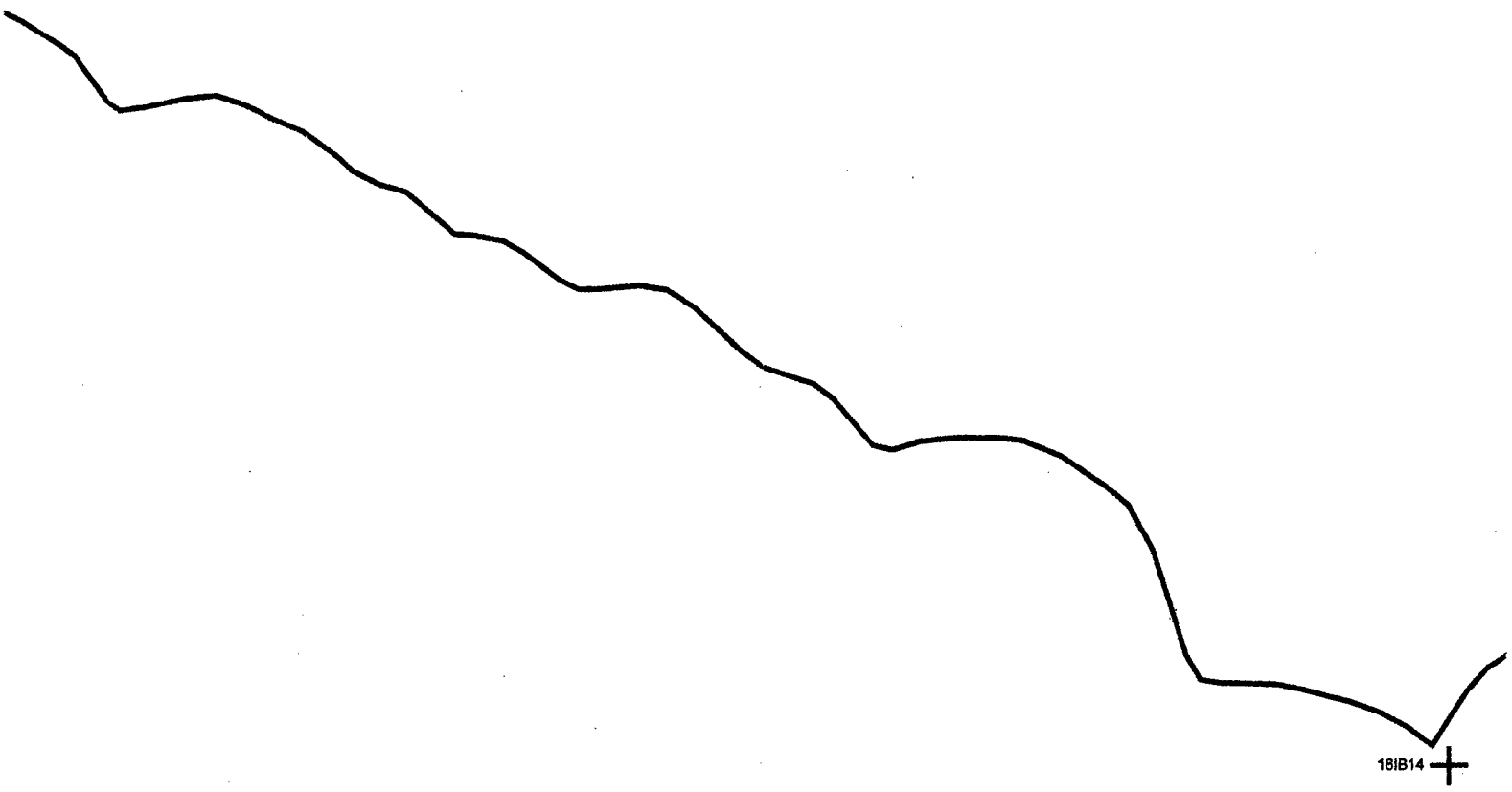
16VM118
16VM29
16IB51

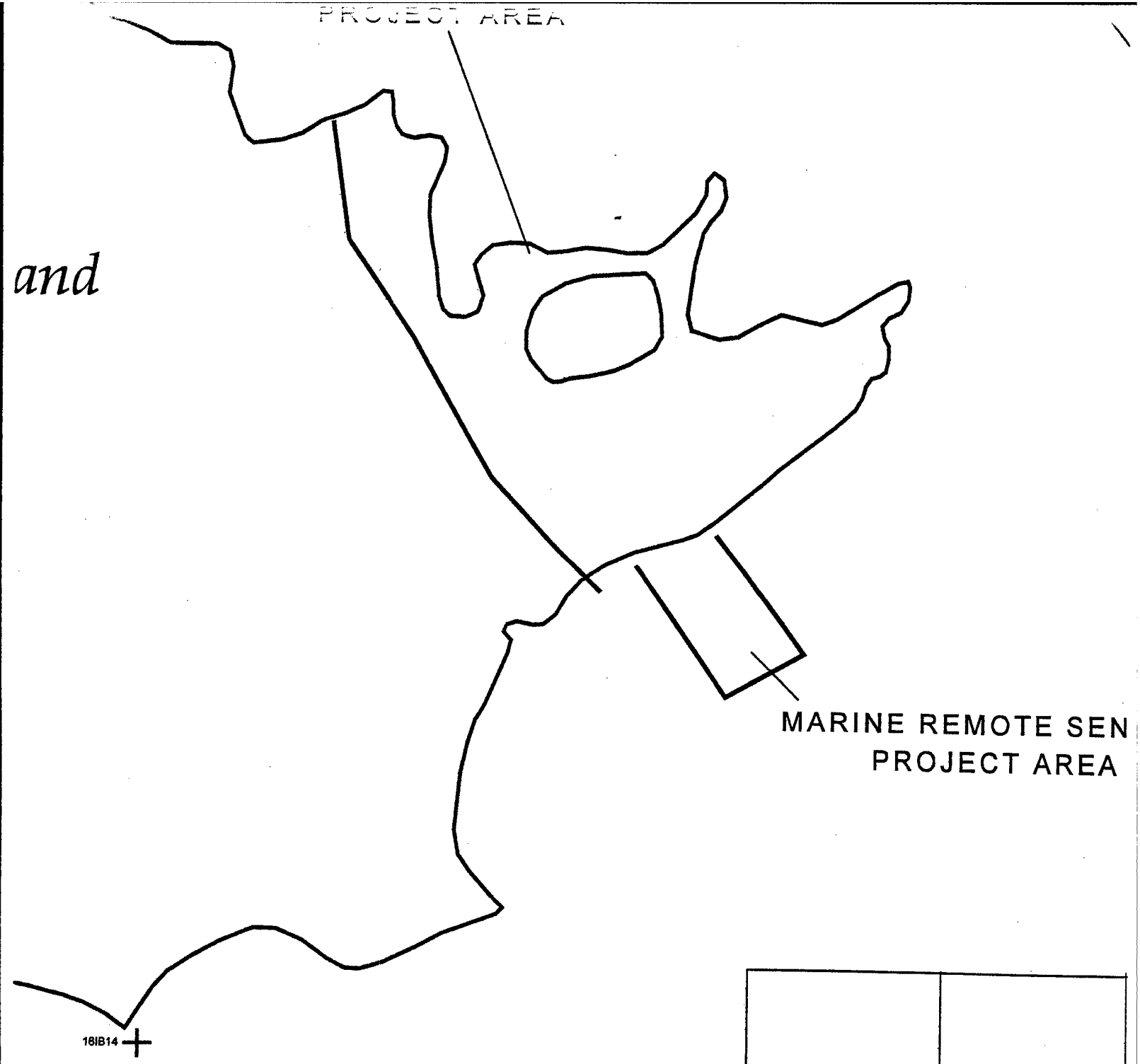
16IB153

16IB152

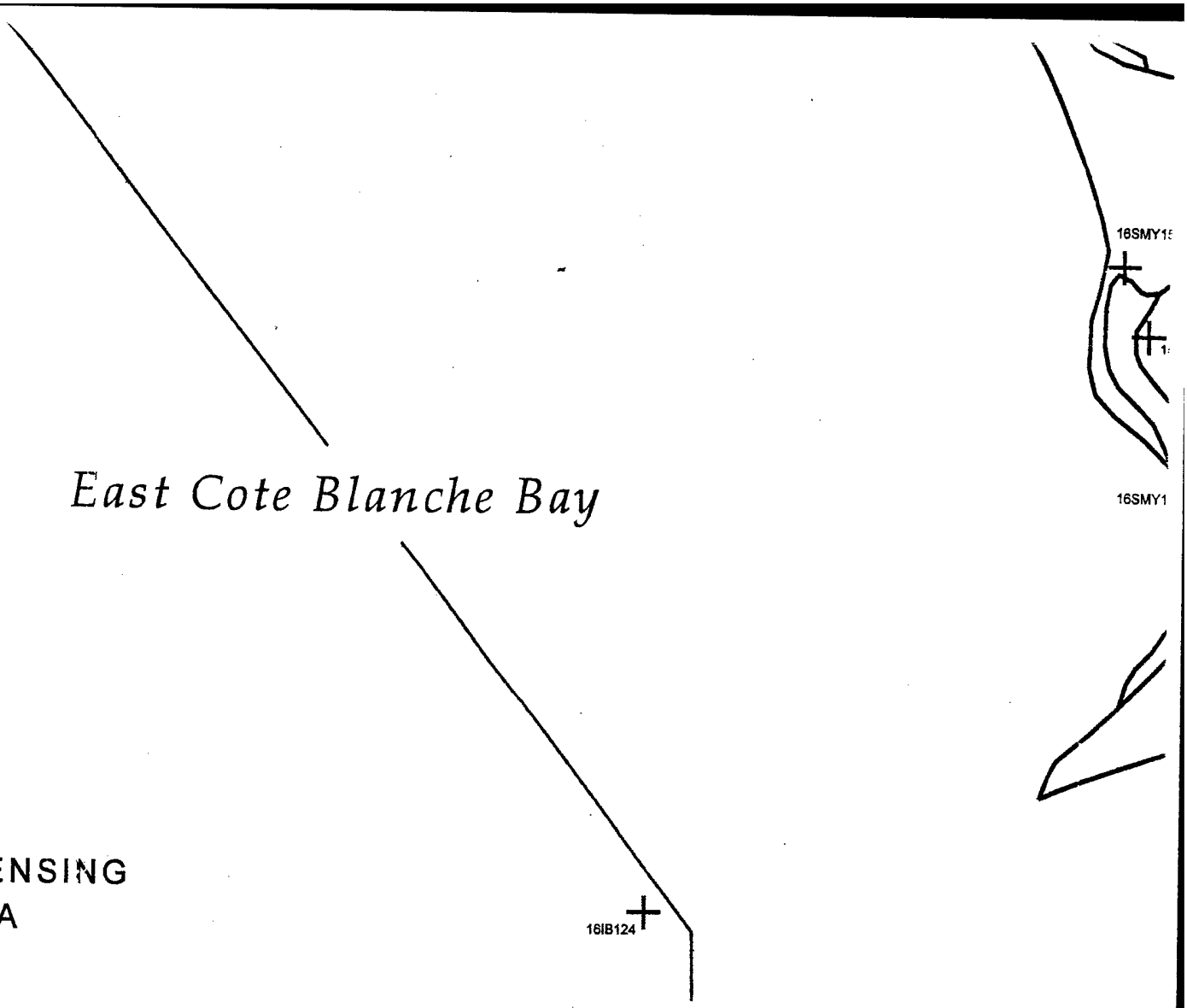
Marsh Island

Hdi



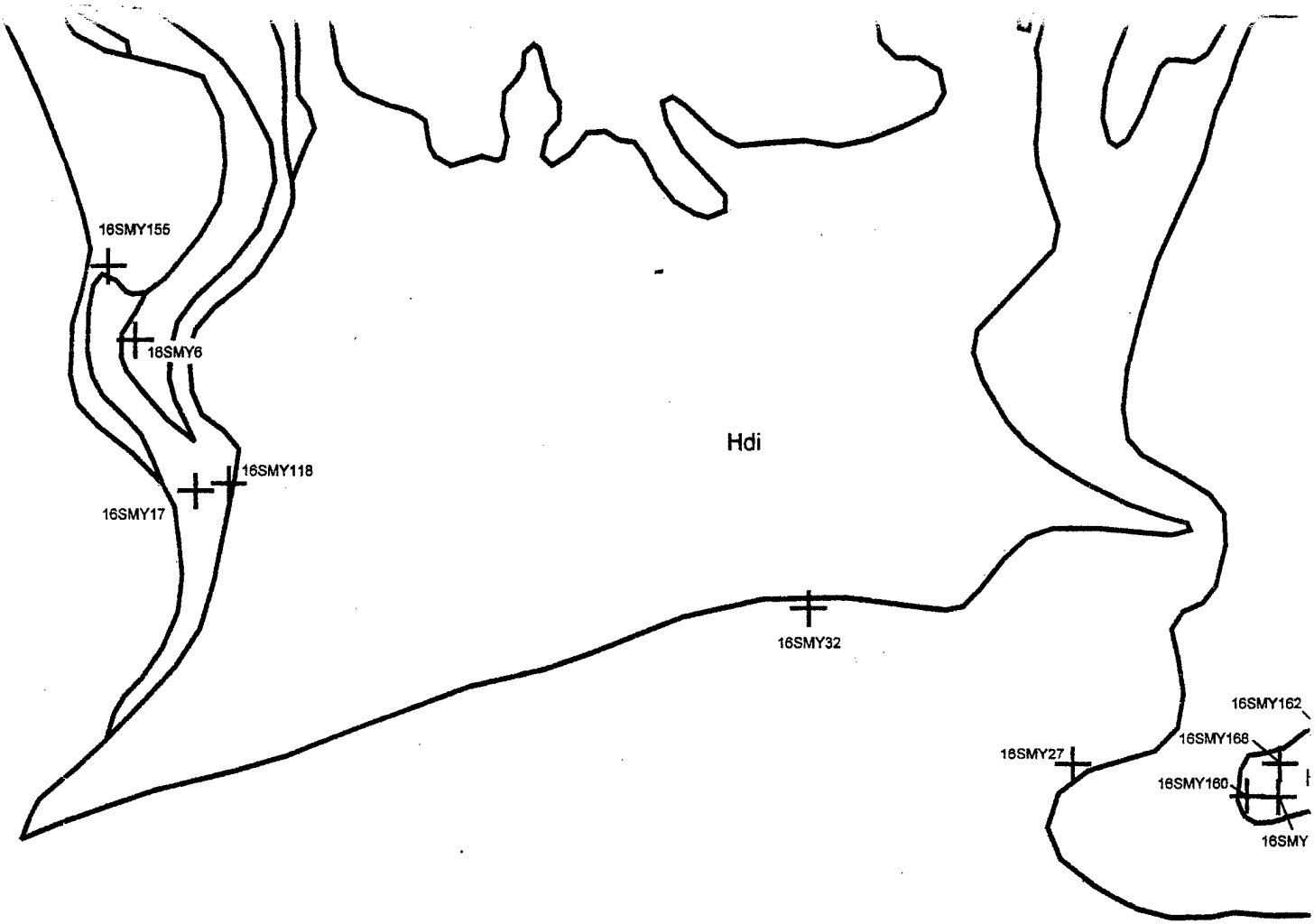


Intracoastal City	Hebert Lake
Fearman Lake	Redfish Point



MOTE SENSING
ECT AREA

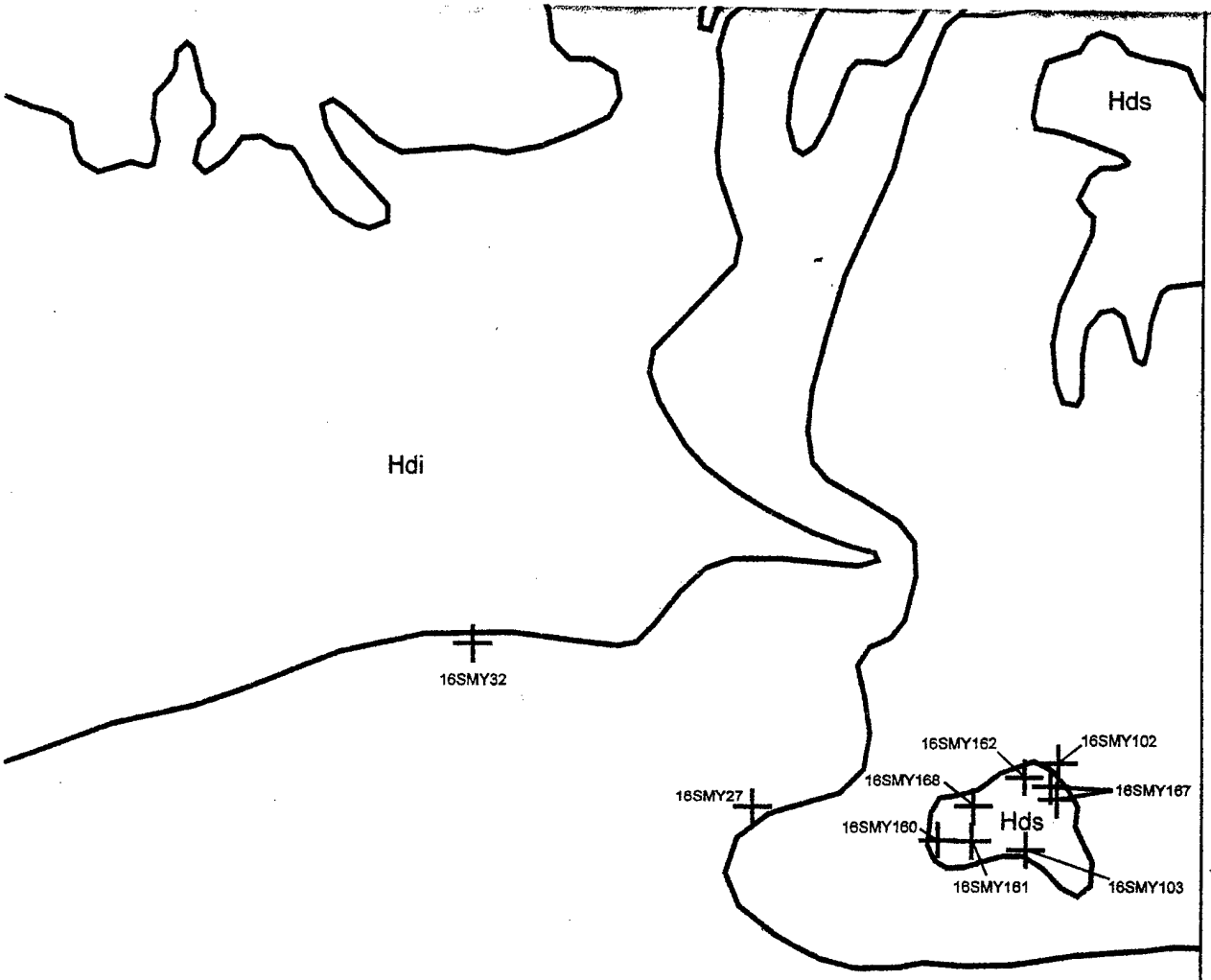
Hebert Lake	Tigre Lagoon	Weeks	Kemper	Franklin	Centerville
Redfish Point	Cypremort Point	Hammock Lake	Marone Point	Ellerelle	North Bend



Centerville

North Bend

BASE MAP COMPOSED OF 1994-95
SYLVAN ASCENT DIGITAL CD\MAPS
INTRACOASTAL CITY, LOUISIANA
HEBERT LAKE, LOUISIANA
TIGRE LAGOON, LOUISIANA

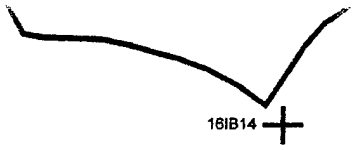


BASE MAP COMPOSED OF 1994-95
SYLVAN ASCENT DIGITAL CD\MAPS:
INTRACOASTAL CITY, LOUISIANA
HEBERT LAKE, LOUISIANA


N


0
5
miles


0
5
kilometers



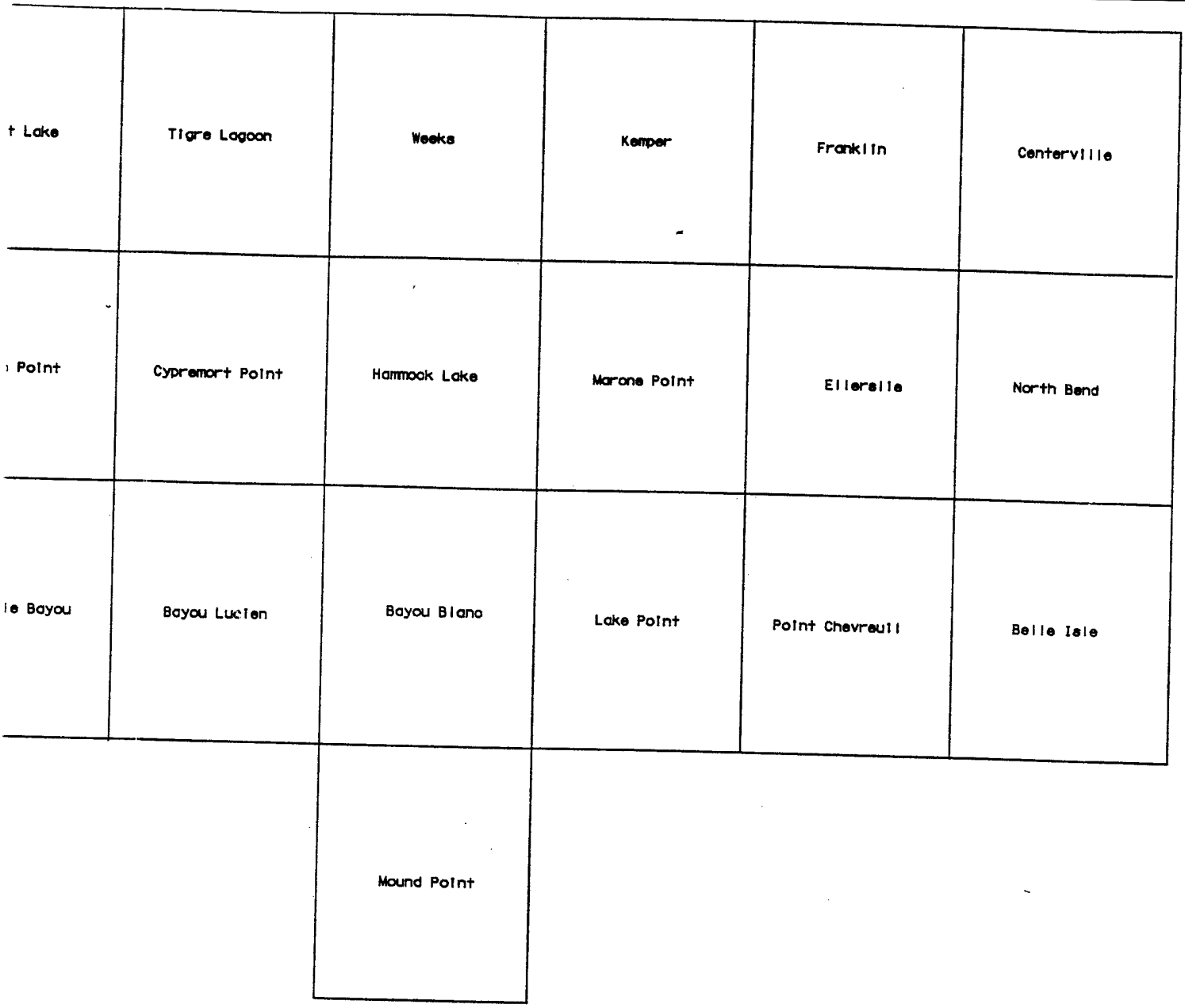
Gulf of

16IB14

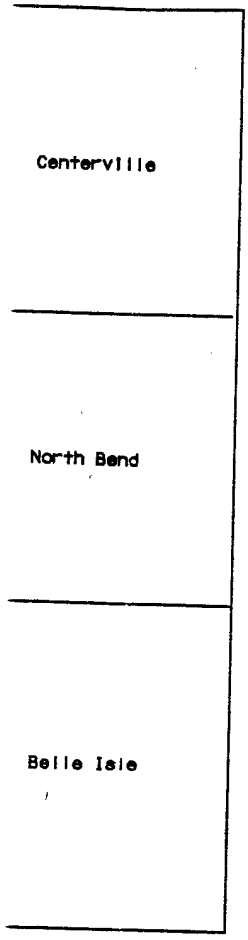
Intracoastal City	Hebert Lake	Tiç
Fearman Lake	Redfish Point	Cypr
Chenlere Au Tigre	Hell Hole Bayou	Ba

ulf of Mexico

PR



+ PREVIOUSLY RECORDED SITE

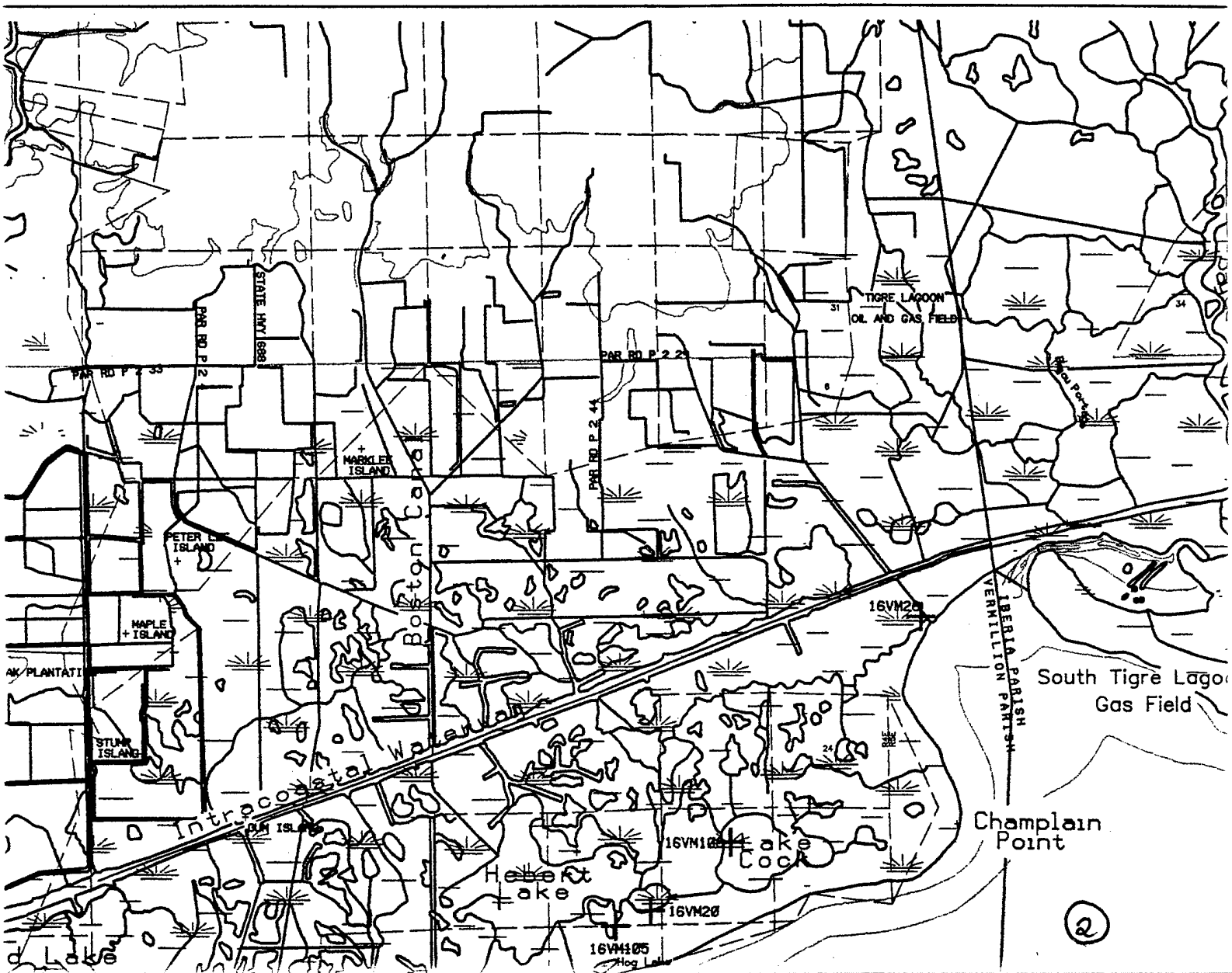


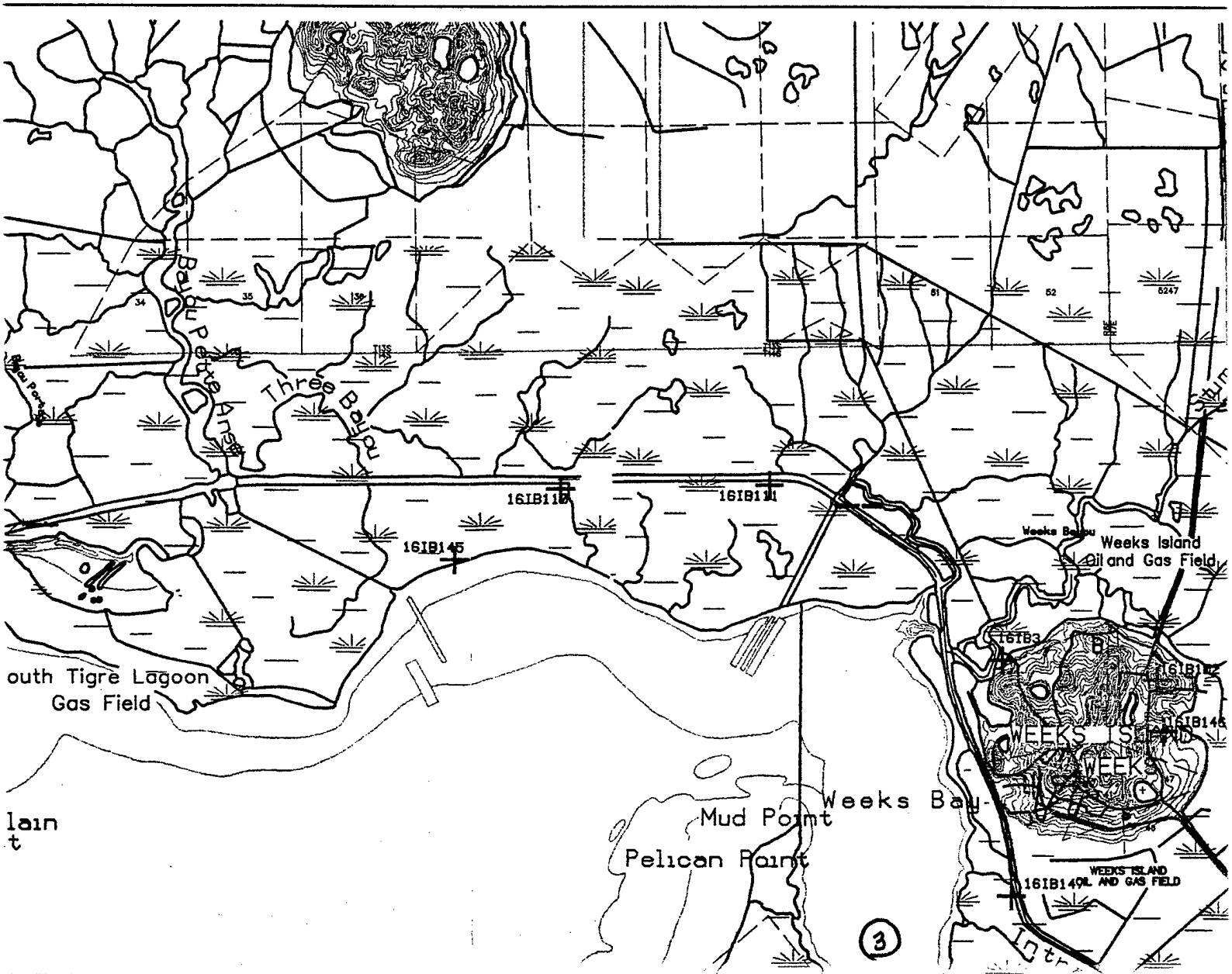
BASE MAP COMPOSED OF 1994-95
SYLVAN ASCENT DIGITAL CD\MAPS:
INTRACOASTAL CITY, LOUISIANA
HEBERT LAKE, LOUISIANA
TIGRE LAGOON, LOUISIANA
WEEKS, LOUISIANA
KEMPER, LOUISIANA
FRANKLIN, LOUISIANA
CENTERVILLE, LOUISIANA
FEARMAN LAKE, LOUISIANA
REDFISH POINT, LOUISIANA
CYPREMORT POINT, LOUISIANA
HAMMOCK LAKE, LOUISIANA
MARONE POINT, LOUISIANA
ELLERSLIE, LOUISIANA
NORTH BEND, LOUISIANA
CHENIERE AU TIGRE, LOUISIANA
HELL HOLE BAYOU, LOUISIANA
BAYOU LUCIEN, LOUISIANA
BAYOU BLANC, LOUISIANA
LAKE POINT, LOUISIANA
POINT CHEVREUIL, LOUISIANA
BELLE ISLE, LOUISIANA
MOUND POINT, LOUISIANA

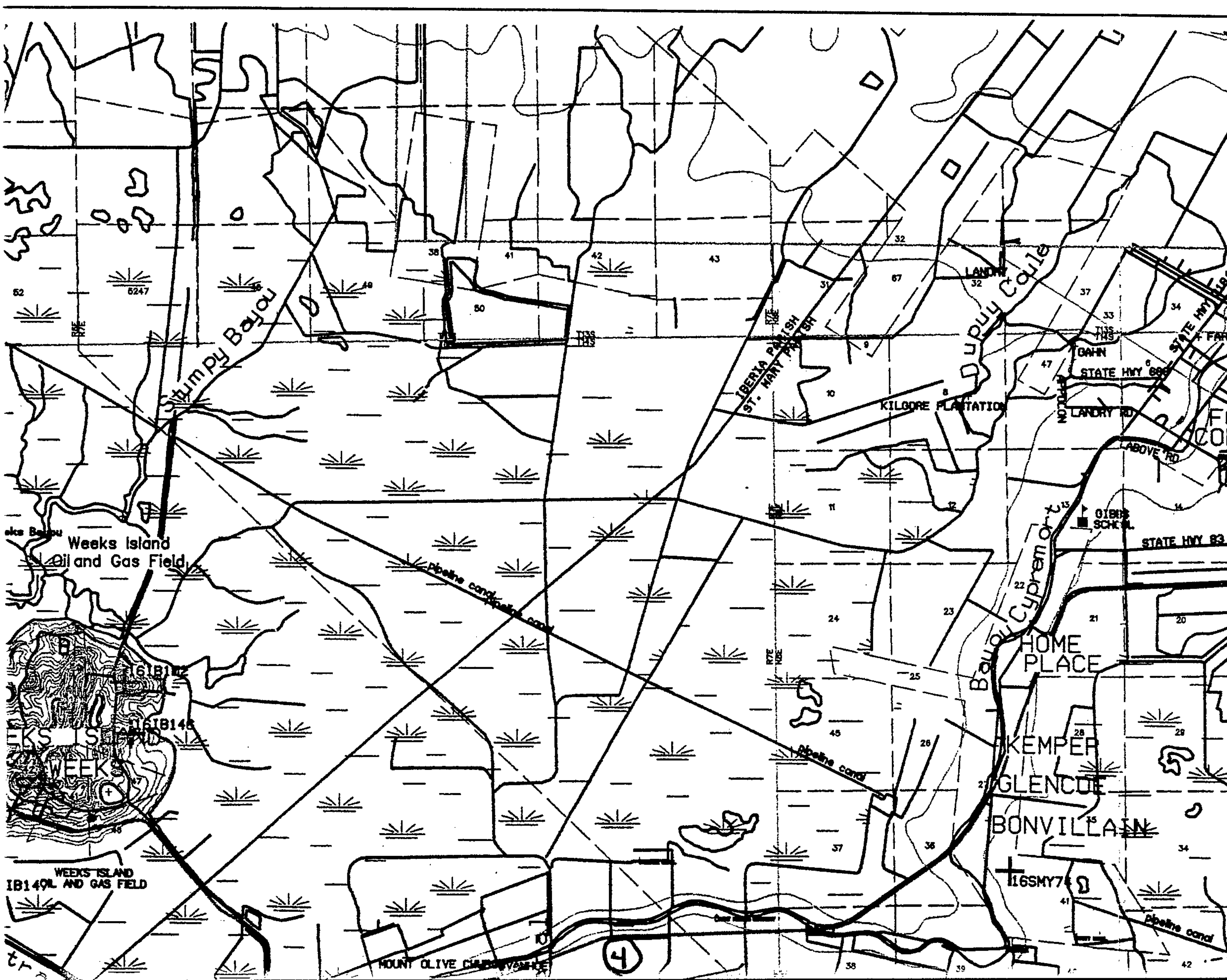
E MAP COMPOSED OF 1994-95
/AN ASCENT DIGITAL CD\MAPS:
ACOASTAL CITY, LOUISIANA
ERT LAKE, LOUISIANA
E LAGOON, LOUISIANA
KS, LOUISIANA
PER, LOUISIANA
NKLIN, LOUISIANA
TERVILLE, LOUISIANA
MAN LAKE, LOUISIANA
TISH POINT, LOUISIANA
REMORT POINT, LOUISIANA
MOCK LAKE, LOUISIANA
ONE POINT, LOUISIANA
RSLIE, LOUISIANA
TH BEND, LOUISIANA
NIERE AU TIGRE, LOUISIANA
HOLE BAYOU, LOUISIANA
OU LUCIEN, LOUISIANA
OU BLANC, LOUISIANA
POINT, LOUISIANA
T CHEVREUIL, LOUISIANA
E ISLE, LOUISIANA
ND POINT, LOUISIANA

Figure 20. **Excerpt from the 1994-1995 digital 7.5 minute series topographic quadrangles Bayou Blanc, B Centerville, Cheniere Au Tiger, Cypremort Point, Ellerslie, Fearman Lake, Franklin, Hammock Herbert Lake, Intracoastal City, Kemper, Lake Point, Marone Point, Mound Point, North Bend, Point, Tigre Lagoon, and Weeks, Louisiana, showing soil series classifications within the M Restoration project area, as well as site locations within an 8.0 km (5 mi) radius from the coastline.**

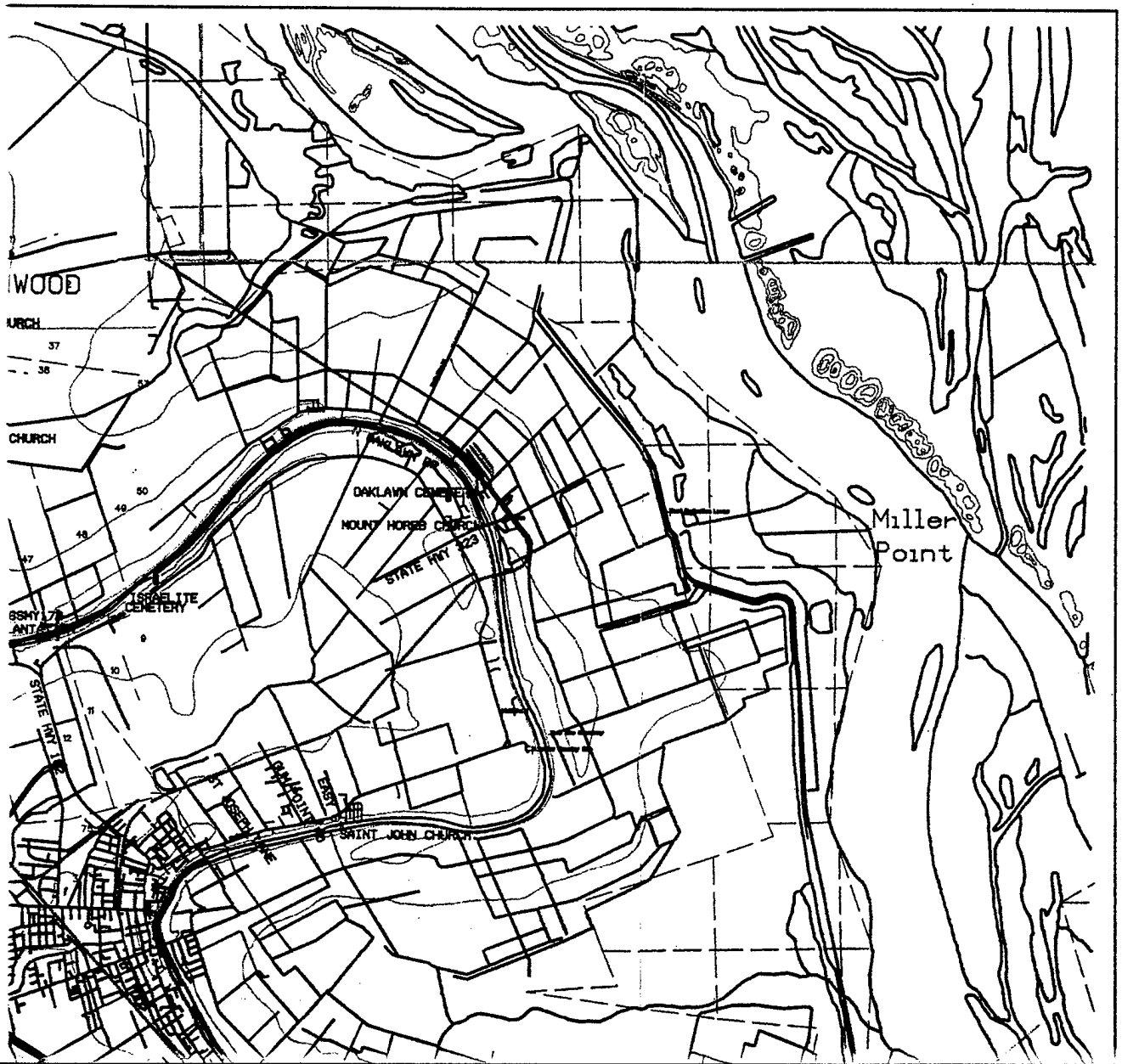
gles Bayou Blanc, Bayou Lucien, Belle Isle, Franklin, Hammock Lake, Hell Hole Bayou, Point, North Bend, Point Chevreuil, Redfish ıtions within the Marsh Island Hydrologic s from the coastline.

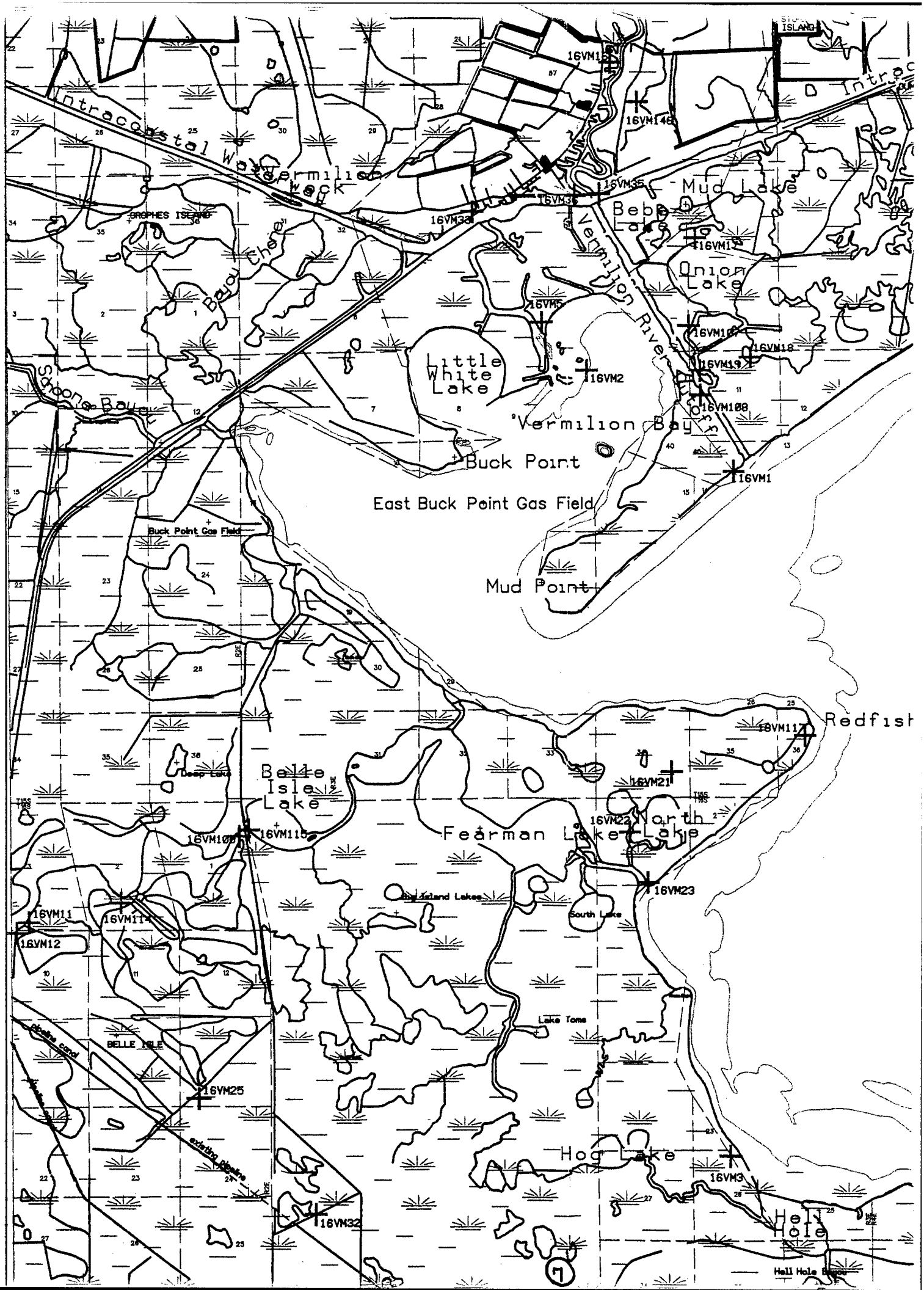


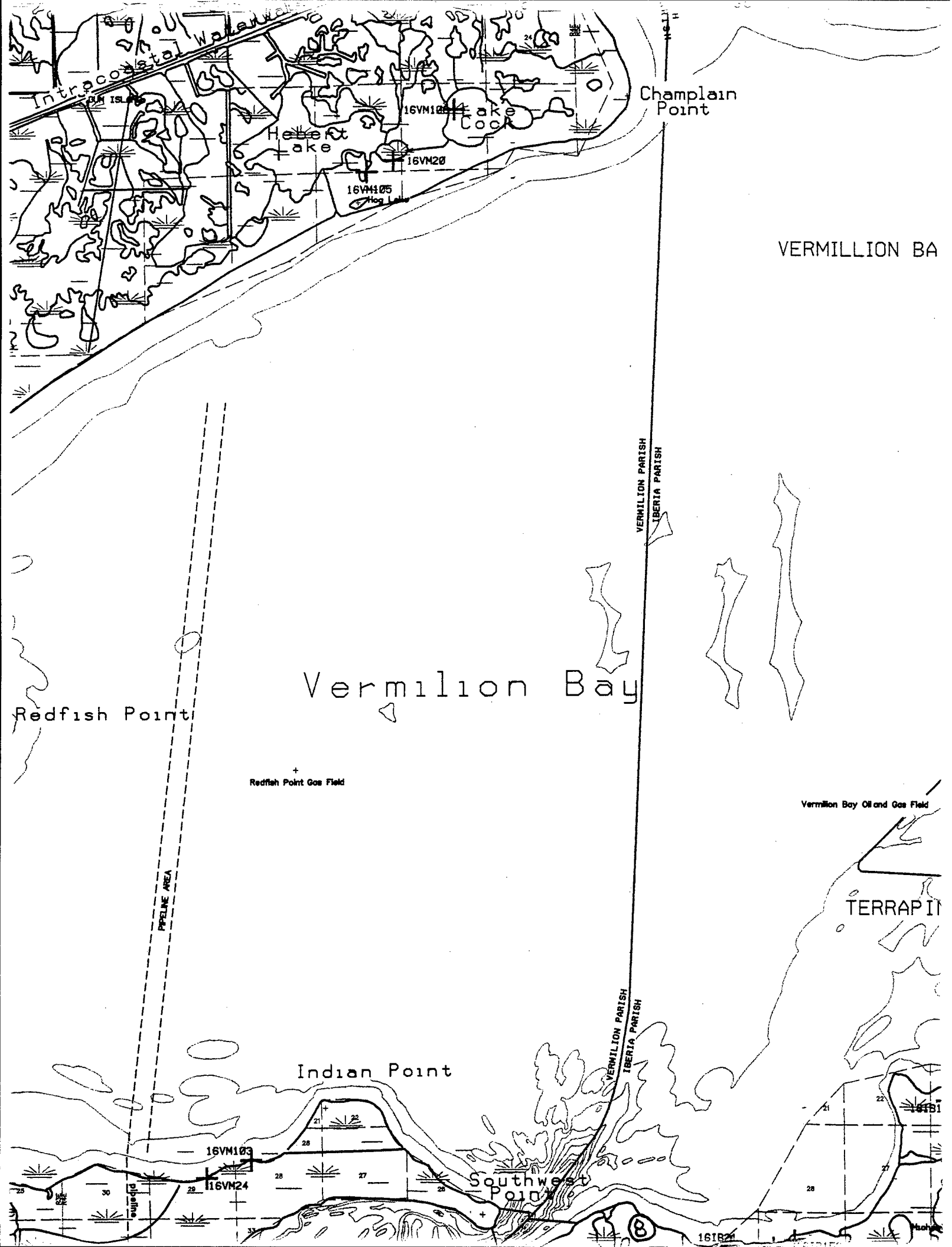

Bayou Petite Anse
Three Bayou
16IB116
16IB111
16IB145
Weeks Bayou
Weeks Island
Oil and Gas Field
16IB3
16IB142
16IB146
WEEKS ISLAND
WEEKS
outh Tigre Lagoon
Gas Field
lain
t
Weeks Bay
Mud Point
Pelican Point
WEEKS ISLAND
16IB149 OIL AND GAS FIELD
3

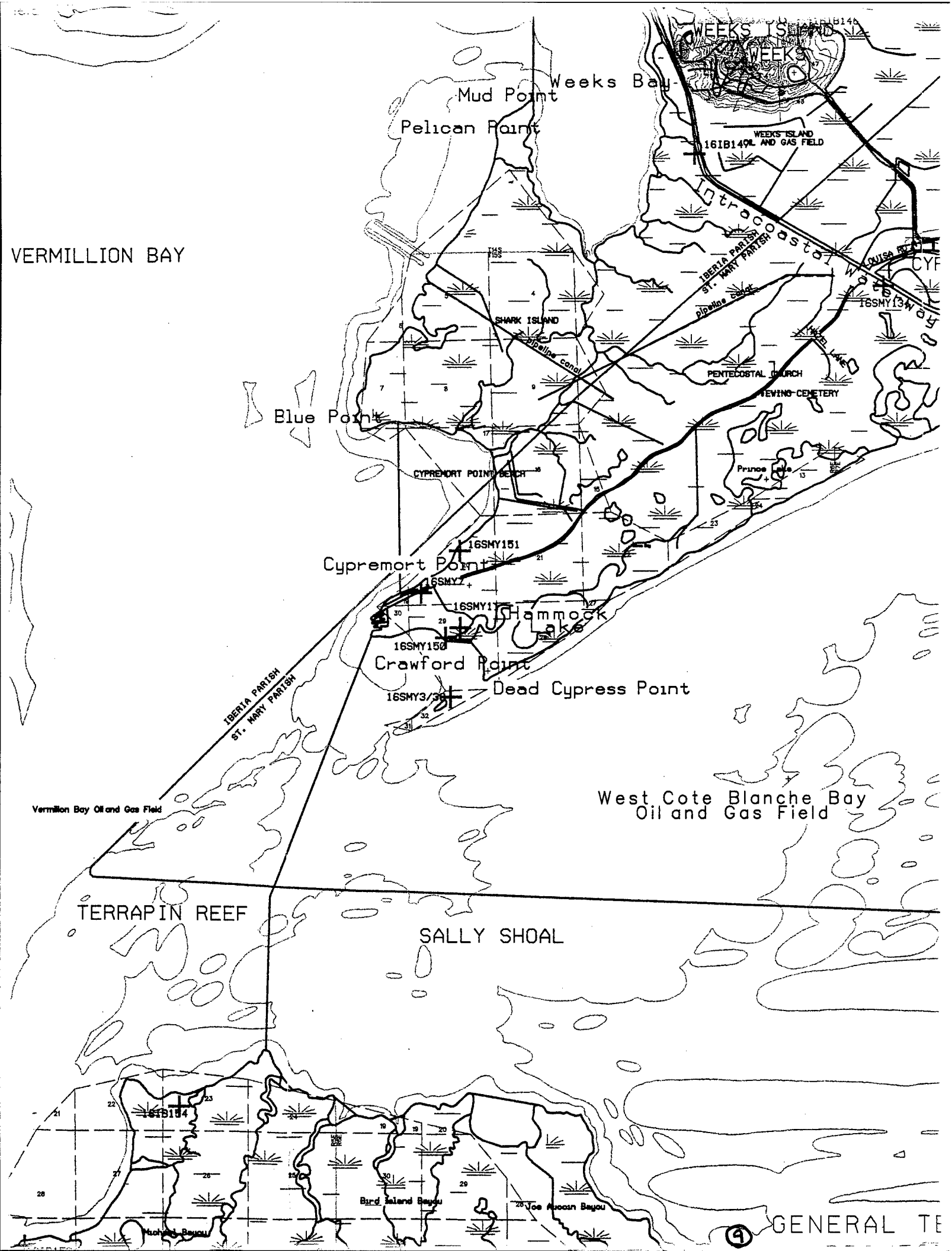

Stumpy Bayou
Weeks Island
Oil and Gas Field
Pipeline canal
IBERIA PARISH
ST. MARY PARISH
KILGORE PLANTATION
LANDRY
GAHN
LANDRY RD
LABOVE RD
STATE HWY 83
Bayou Cypremort
HOME
PLACE
KEMPER
GLENCOE
BONVILLAIN
WEEKS ISLAND
OIL AND GAS FIELD
IB149
16SMY7
4

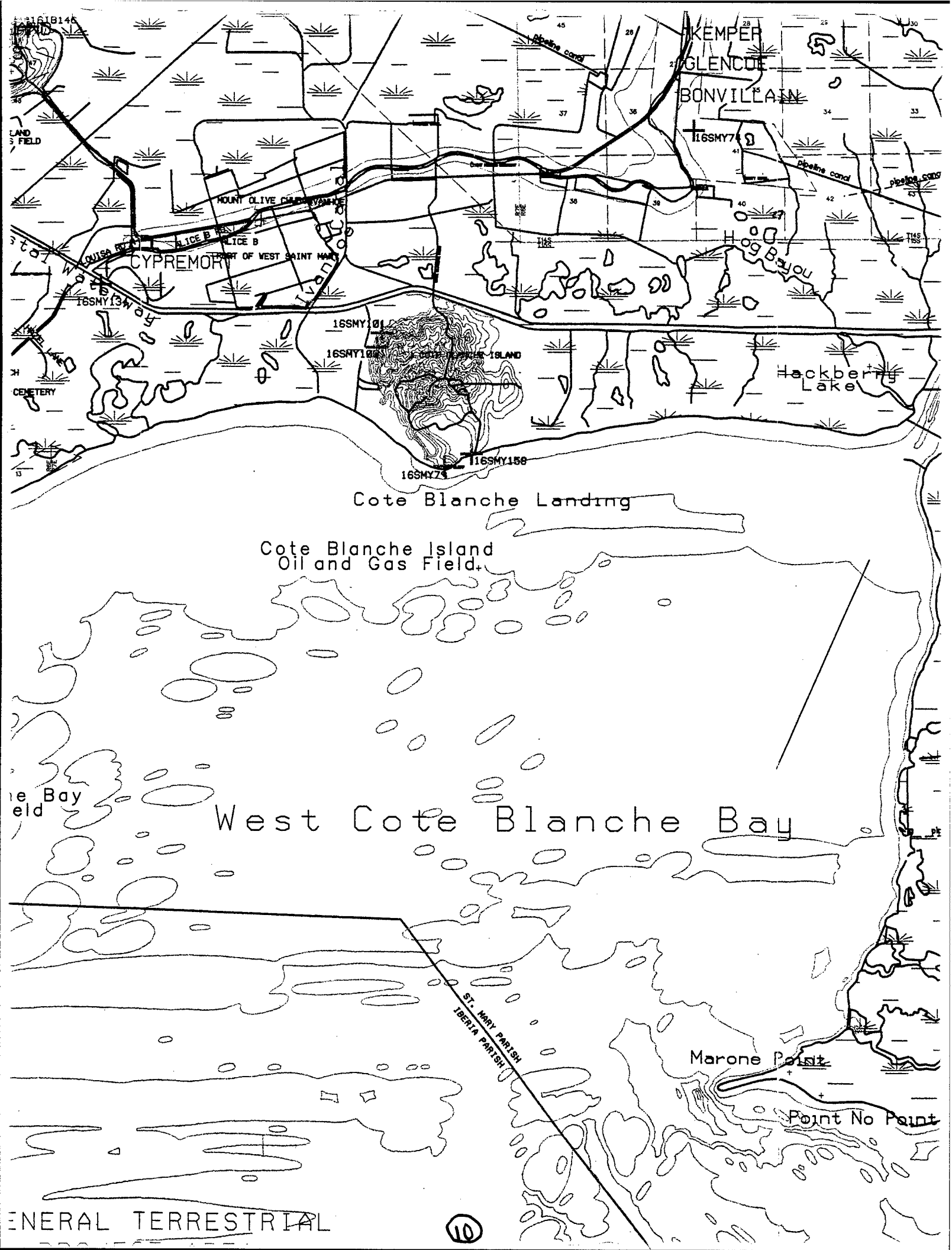

ADELINE
Jeanerette Oil and Gas Field
16SMY17
16SMY17
NWOOD
GOODMAN CHURCH
DESLONDE
BLUEBIRD LANE
NAZARENE CHURCH
JULIEN
FOUR CORNERS
DUMESNIL
PREVOST
BODIN
GOLD MINE
ASHTON
RODRIGUE
CHOUPIQUE
RICHARD
STATE HWY 83
STATE HWY 668
ABOVE RD
FARMERS
GAHN
DIBBS SCHOOL
LUCY PLANT
16SMY178
STATE HWY 182
pipeline canal
pipeline canal
pipeline canal
Bayou Chouipique
Bayou Teche
Bayou Teche
5

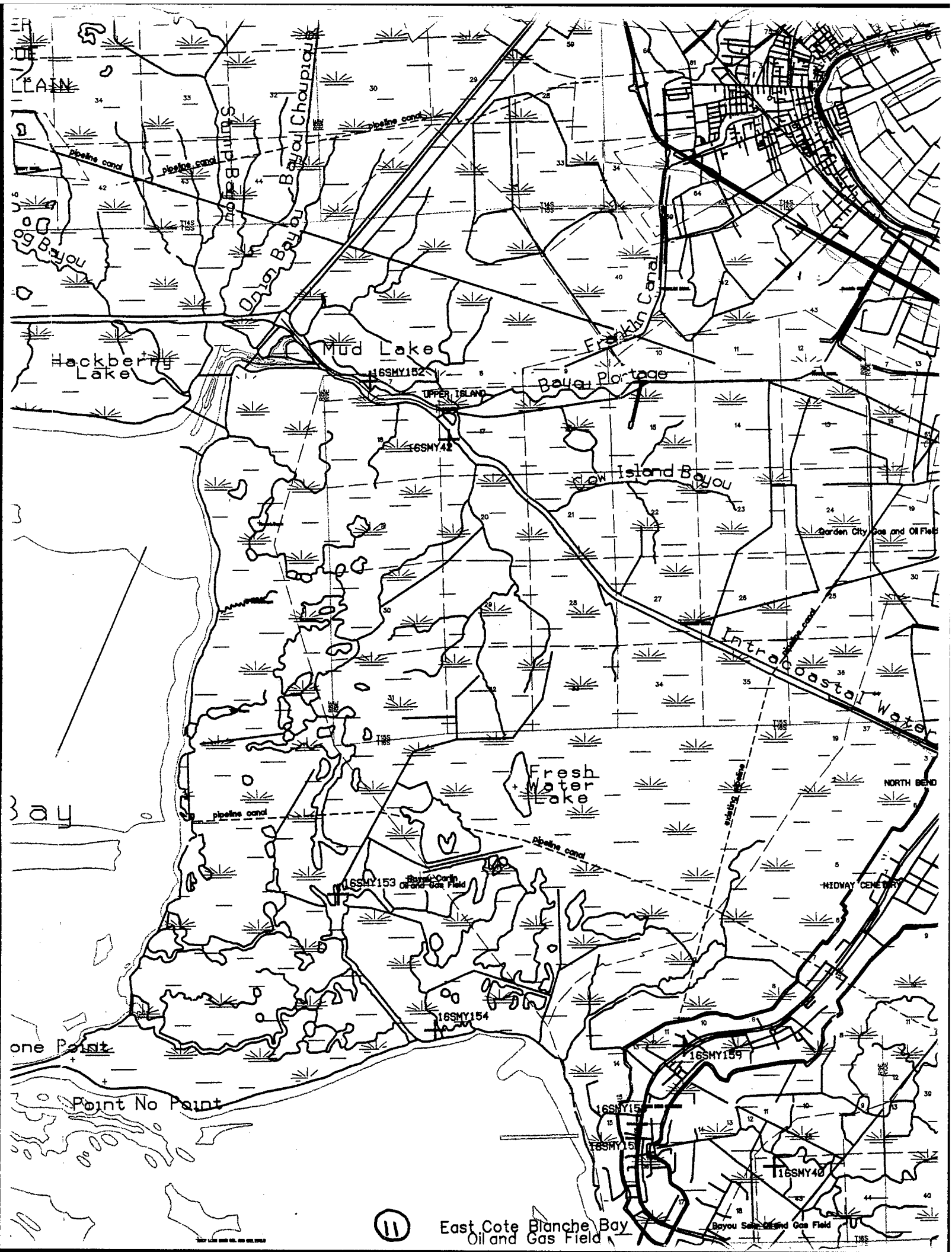

WOOD
URCH
CHURCH
OAKLAWN CEMETERY
MOUNT HOREB CHURCH
STATE HWY 223
ISRAELITE CEMETERY
STATE HWY 17
SAINT JOHN CHURCH
Miller Point

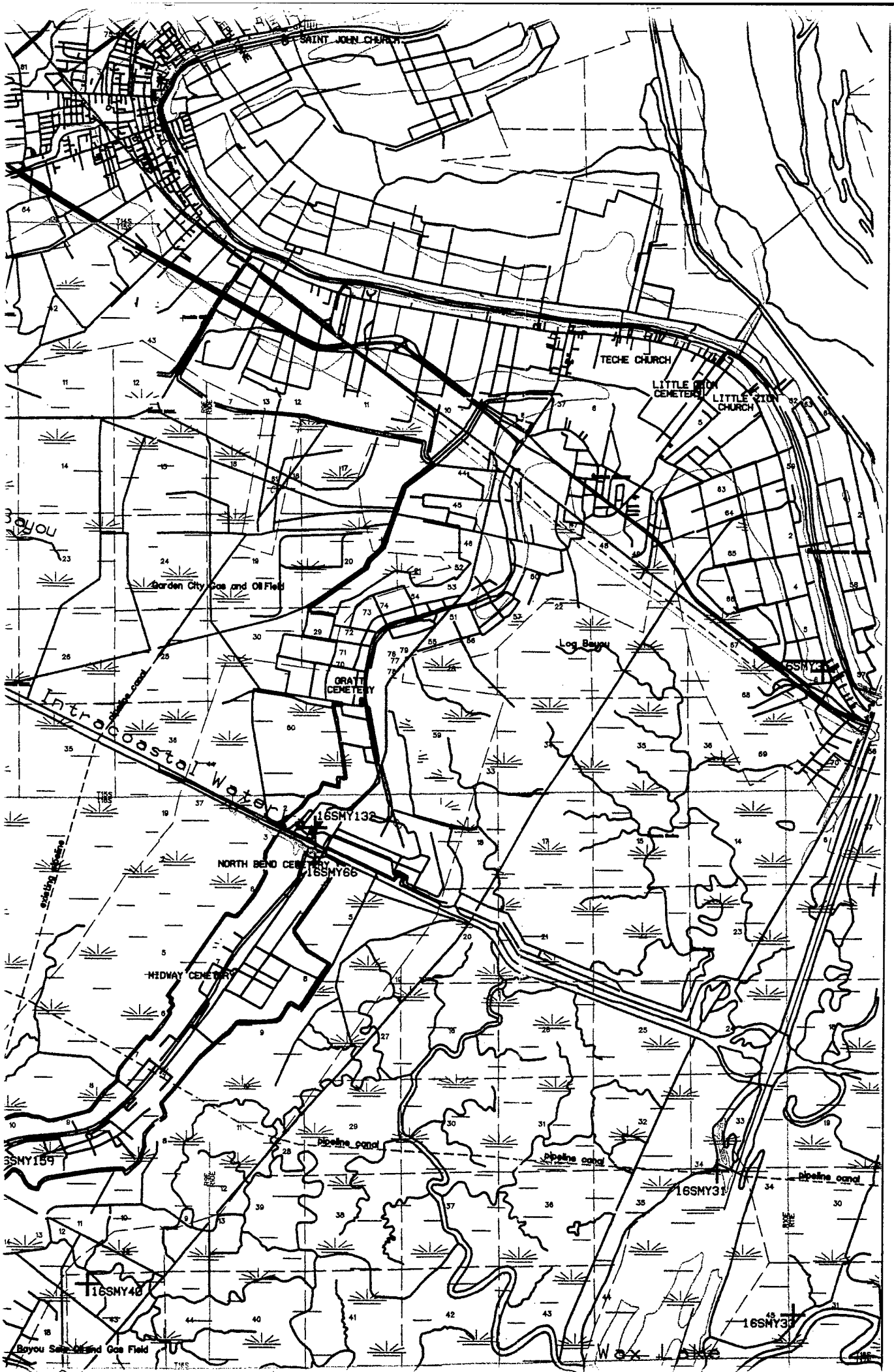

Intracoastal Waterway
Vermilion
Bayou Chene
Saxon Bayou
Little White Lake
Vermilion River
Mud Lake
Bebe Lake
Union Lake
Vermilion Bay
Buck Point
East Buck Point Gas Field
Buck Point Gas Field
Mud Point
Belle Isle Lake
Fearman Lake
North Lake
Redfish
Deep Lake
Big Island Lakes
South Lake
Lake Toma
BELLE ISLE
Hog Lake
Hell Hole
existing pipeline
16VM1
16VM2
16VM3
16VM5
16VM11
16VM12
16VM14
16VM15
16VM16
16VM17
16VM18
16VM19
16VM21
16VM22
16VM23
16VM25
16VM32
16VM33
16VM35
16VM36
16VM100
16VM108
16VM115
16VM117


Intracoastal Waterway
Champlain Point
Lake Cock
Hebert Lake
16VM20
16VM105
VERMILION BA
VERMILION PARISH
IBERIA PARISH
Vermilion Bay
Redfish Point
Redfish Point Gas Field
PIPELINE AREA
Vermilion Bay Oil and Gas Field
TERRAPI
Indian Point
16VM103
16VM24
Southwest Point
8

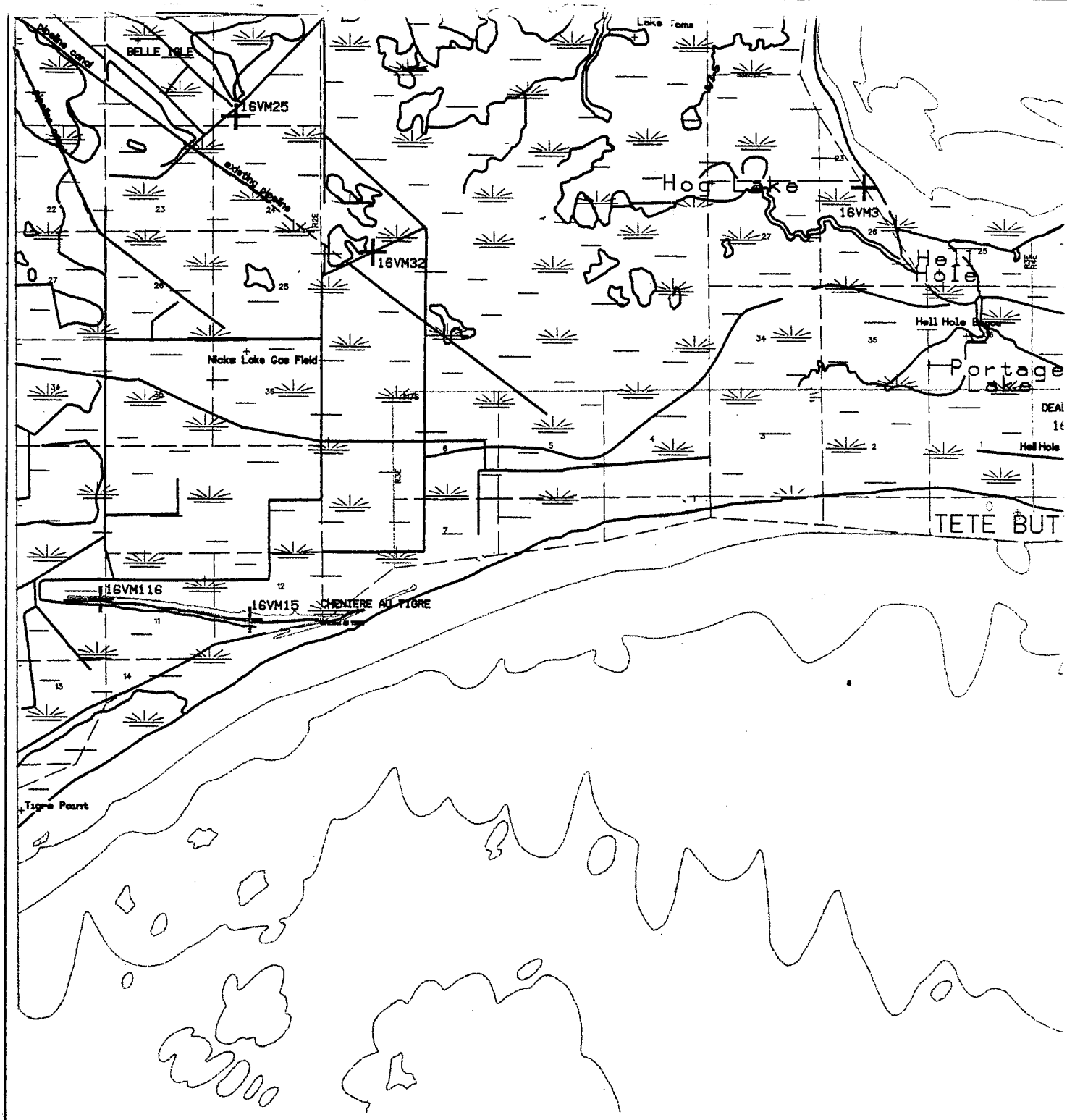

WEEKS ISLAND
WEEKS
Weeks Bay
Mud Point
Pelican Point
16IB149
WEEKS ISLAND OIL AND GAS FIELD
Intracoastal Waterway
IBERIA PARISH
ST. MARY PARISH
pipeline canal
16SMY134
VERMILLION BAY
SHARK ISLAND
pipeline canal
PENTECOSTAL CHURCH
VIEWING CEMETERY
Blue Point
CYPREMORT POINT BEACH
Prince Lake
16SMY151
Cypremort Point
16SMY7
16SMY11
Hammock Lake
16SMY150
Crawford Point
16SMY3/38
Dead Cypress Point
IBERIA PARISH
ST. MARY PARISH
Vermilion Bay Oil and Gas Field
West Cote Blanche Bay
Oil and Gas Field
TERRAPIN REEF
SALLY SHOAL
16IB154
Bird Island Bayou
Joe Aucoin Bayou
Michael Bayou
GENERAL TE
9

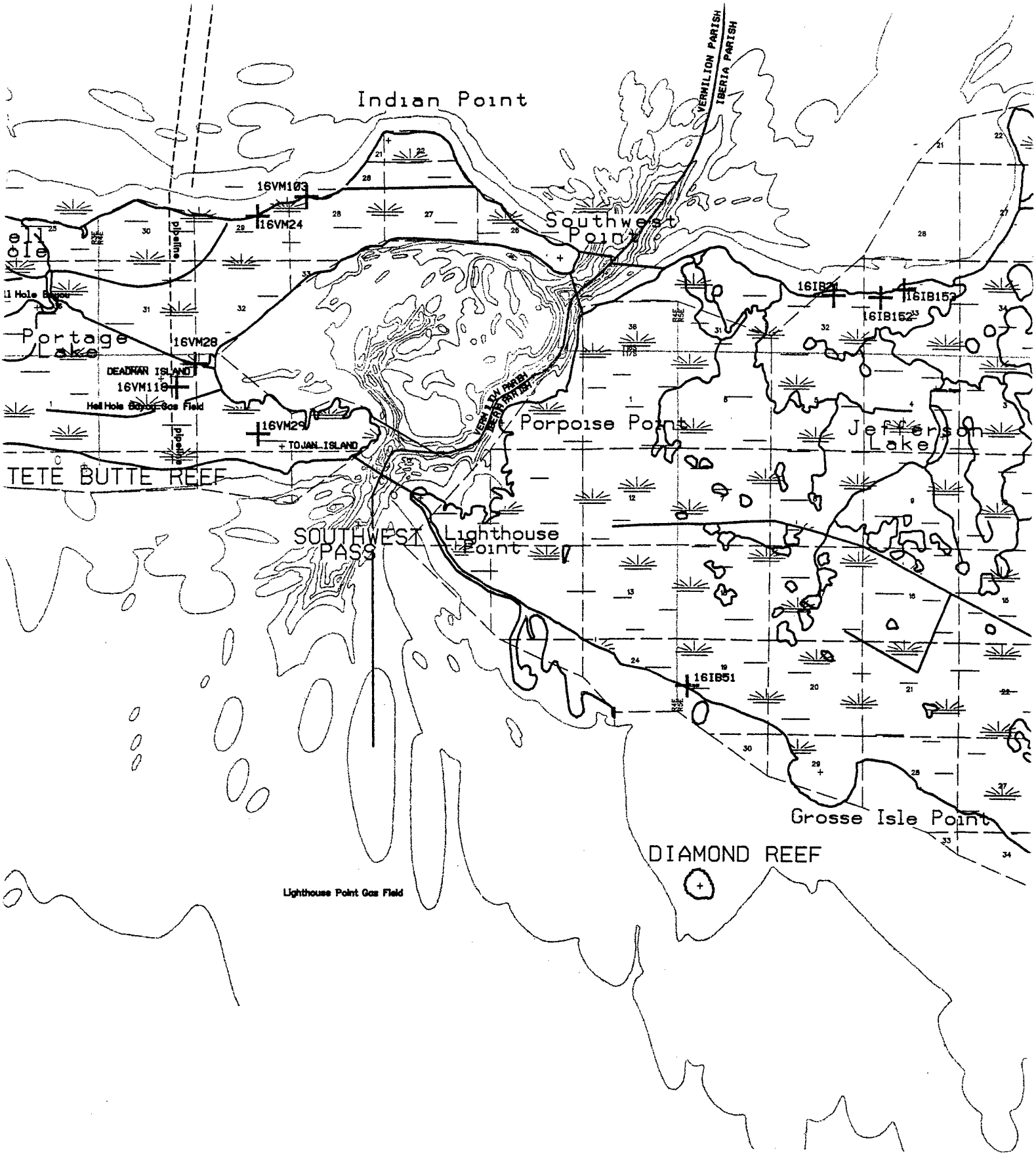

16SMY146
KEMPER
GLENCOE
BONVILLAIN
16SMY74
pipeline canal
pipeline canal
pipeline canal
MOUNT OLIVE CHURCH
ALICE B
ALICE B
POINT OF WEST SAINT MARY
CYPREMORT
Intracoastal Waterway
Hog Bayou
16SMY134
16SMY101
16SMY100
COTE BLANCHE ISLAND
Hackberry Lake
CEMETERY
16SMY158
16SMY74
Cote Blanche Landing
Cote Blanche Island
Oil and Gas Field
West Cote Blanche Bay
ST. MARY PARISH
IBERIA PARISH
Marone Point
Point No Point
ENERAL TERRESTRIAL
10

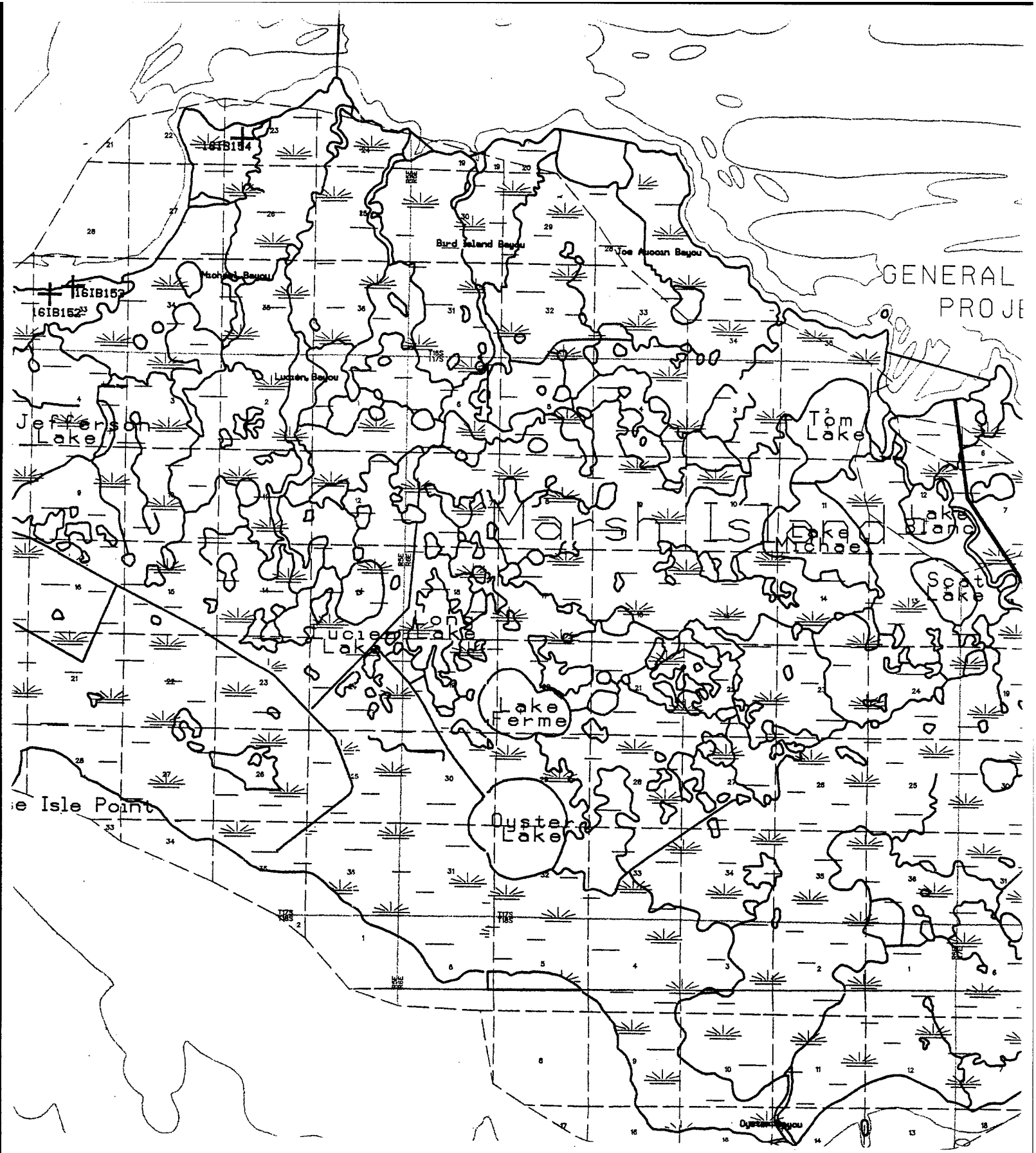

Mud Lake
Hackberry Lake
Franklin Canal
Bayou Portage
16SMY152
UPPER ISLAND
16SMY42
Low Island Bayou
Garden City Gas and Oil Field
Intracoastal Water
Fresh Water Lake
NORTH BEND
pipeline canal
16SMY153
Bayou Carlin Oil and Gas Field
MIDWAY CEMETERY
16SMY154
16SMY159
16SMY40
Bayou Sale Oil and Gas Field
Point No Point
East Cote Blanche Bay Oil and Gas Field
11

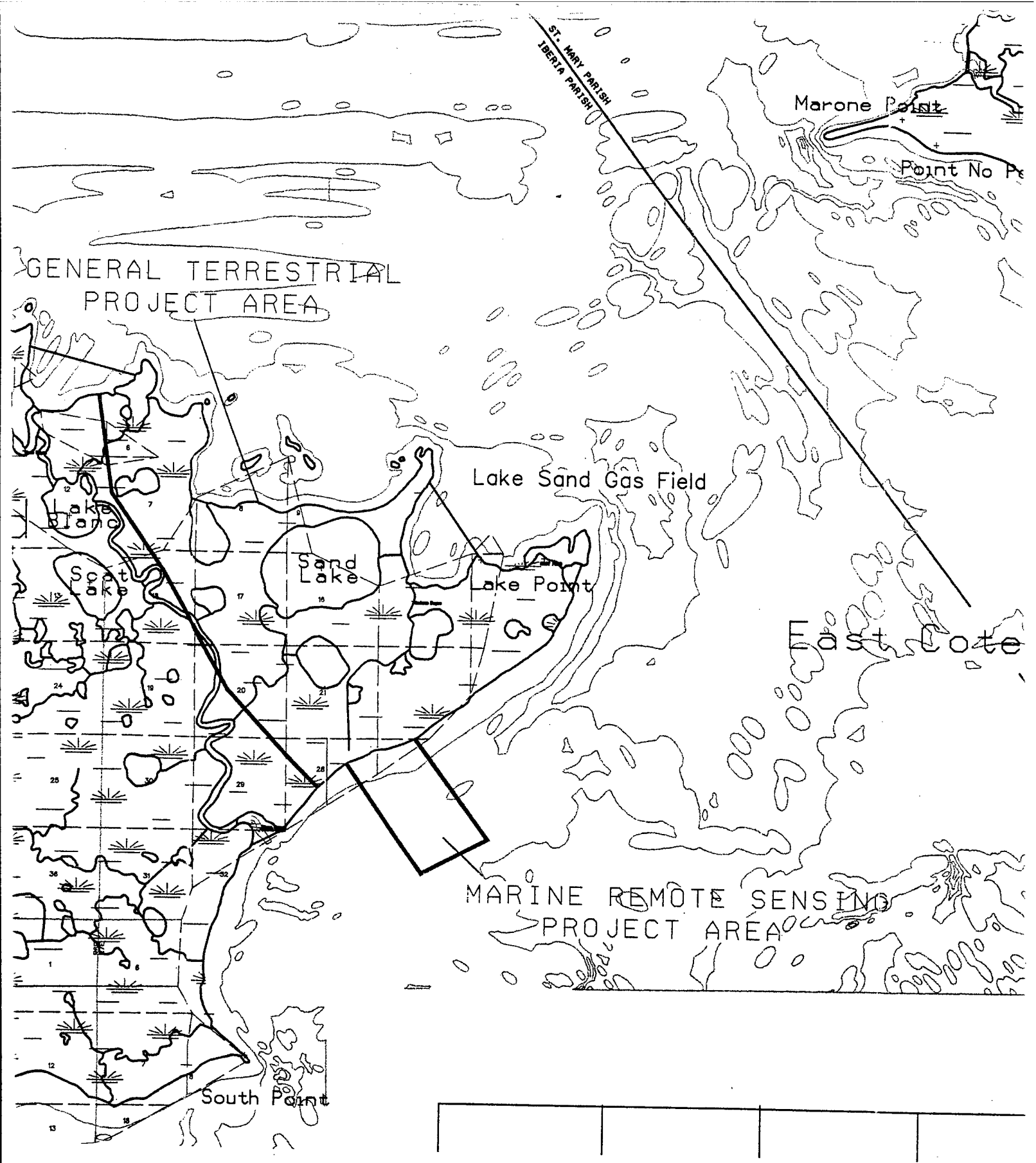

SAINT JOHN CHURCH
TECHE CHURCH
LITTLE ZION CEMETERY
LITTLE ZION CHURCH
Bayou
Garden City Gas and Oil Field
GRATIS CEMETERY
Log Bayou
16SMY132
Intracoastal Waterway
NORTH BEND CEMETERY
16SMY66
MIDWAY CEMETERY
existing pipeline
pipeline canal
16SMY159
16SMY31
16SMY40
16SMY37
Bayou Sale Oil and Gas Field
Wax Lake

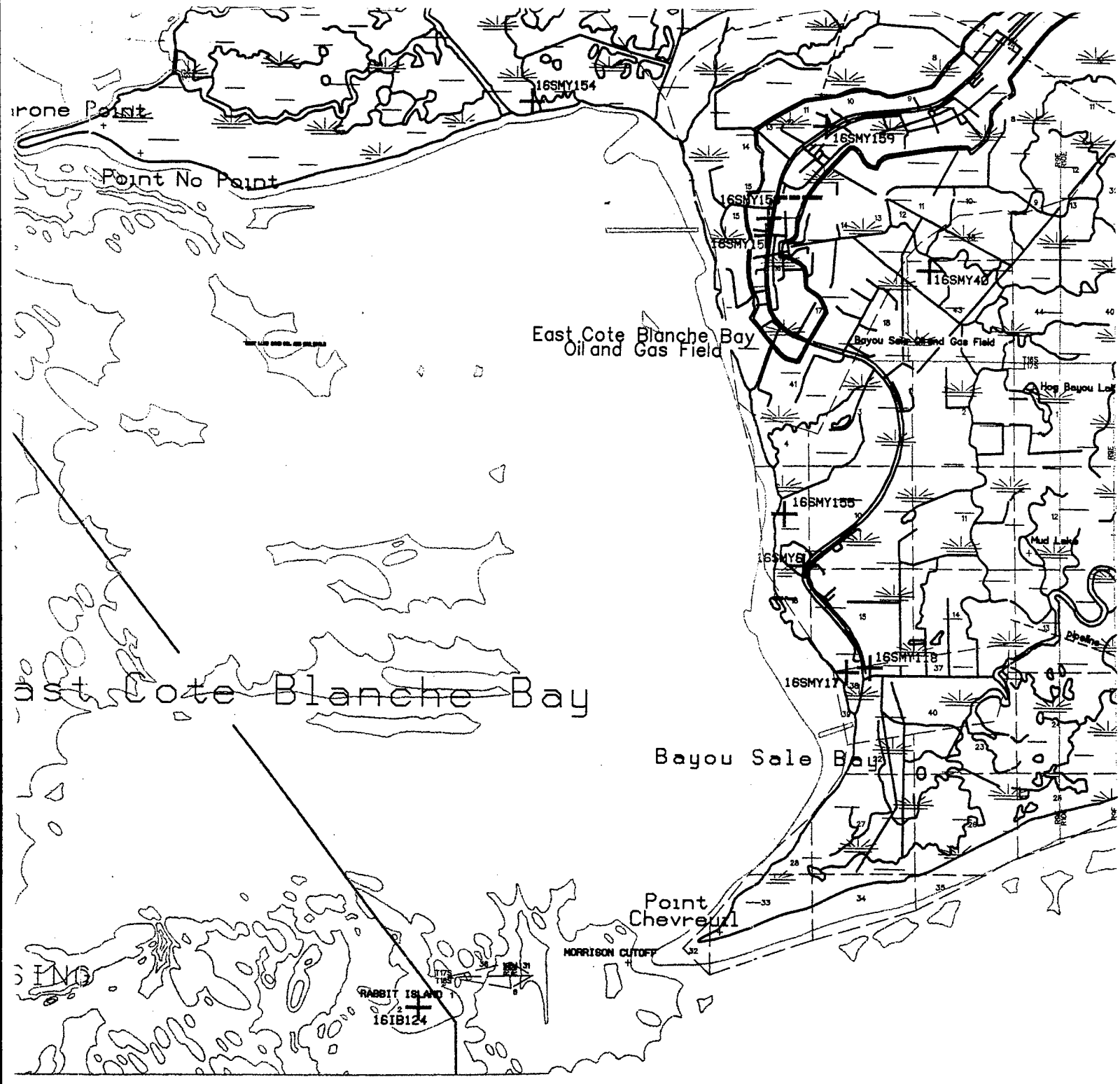
12

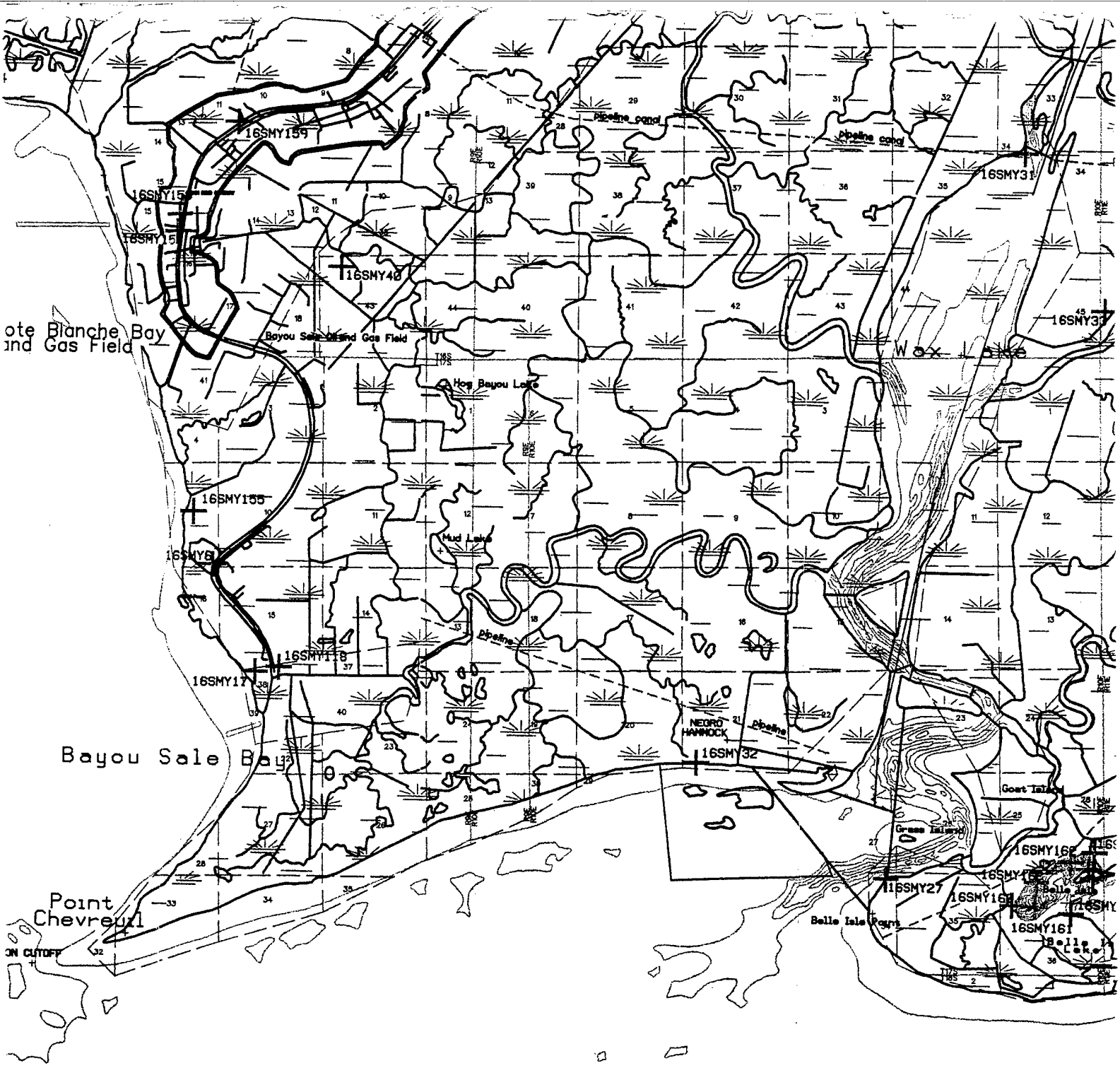

Lake Toma
BELLE ISLE
16VM25
existing pipeline
Hog Lake
16VM3
16VM32
Hell Hole
Hell Hole Bayou
Nicks Lake Gas Field
Portage Lake
Hell Hole
TETE BUT
16VM116
16VM15
CHENIERE AU TIGRE
Tigre Point

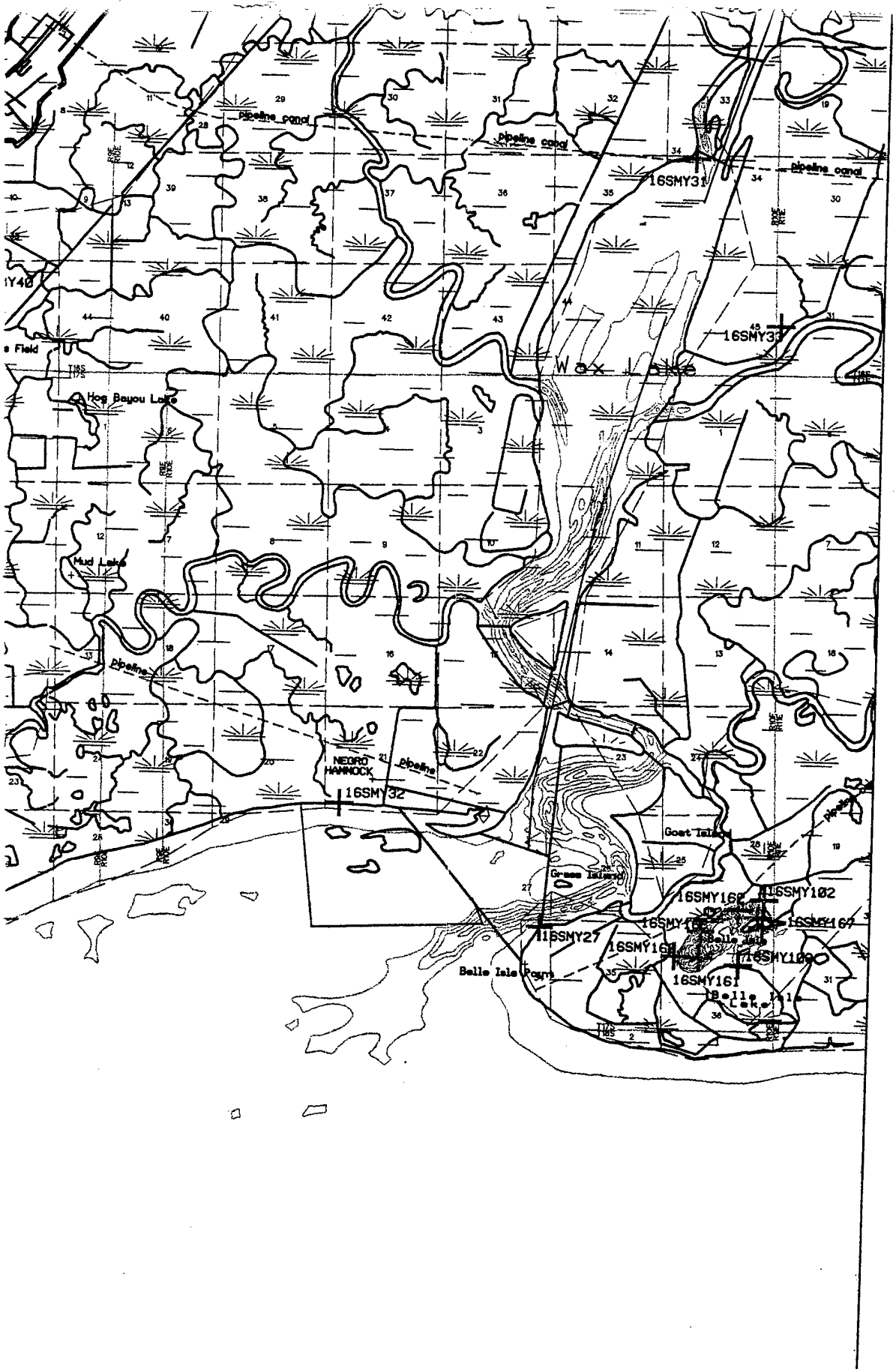

Indian Point
VERMILION PARISH
IBERIA PARISH
16VM103
16VM24
Southwest Point
pipeline
Portage Lake
16VM28
DEADMAN ISLAND
16VM118
Hell Hole Bayou Gas Field
16VM29
TOJAN ISLAND
TETE BUTTE REEF
Porpoise Point
Jefferson Lake
16IB51
16IB152
SOUTHWEST PASS
Lighthouse Point
Lighthouse Point Gas Field
Grosse Isle Point
DIAMOND REEF


16IB154
16IB153
16IB152
Burd Island Bayou
Joe Aucoin Bayou
Mahoney Bayou
Lucien Bayou
GENERAL
PROJE
Jefferson
Lake
Tom
Lake
Marsh Island
Lake
Blanc
Lake
Michael
Scat
Lake
Lake
Lake
Lake
Ferme
Oyster
Lake
e Isle Point
Oyster Bayou

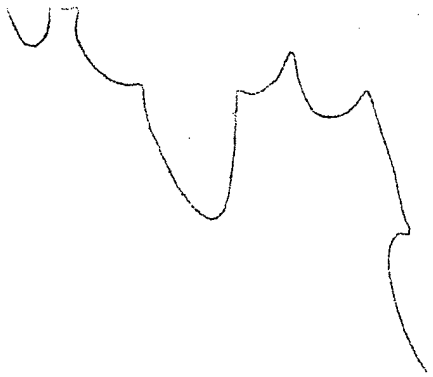

ST. MARY PARISH
IBERIA PARISH
Marone Point
Point No Pe
GENERAL TERRESTRIAL
PROJECT AREA
Lake Sand Gas Field
Lake
Diana
Scat
Lake
Sand
Lake
Lake Point
East Cote
MARINE REMOTE SENSING
PROJECT AREA
South Point

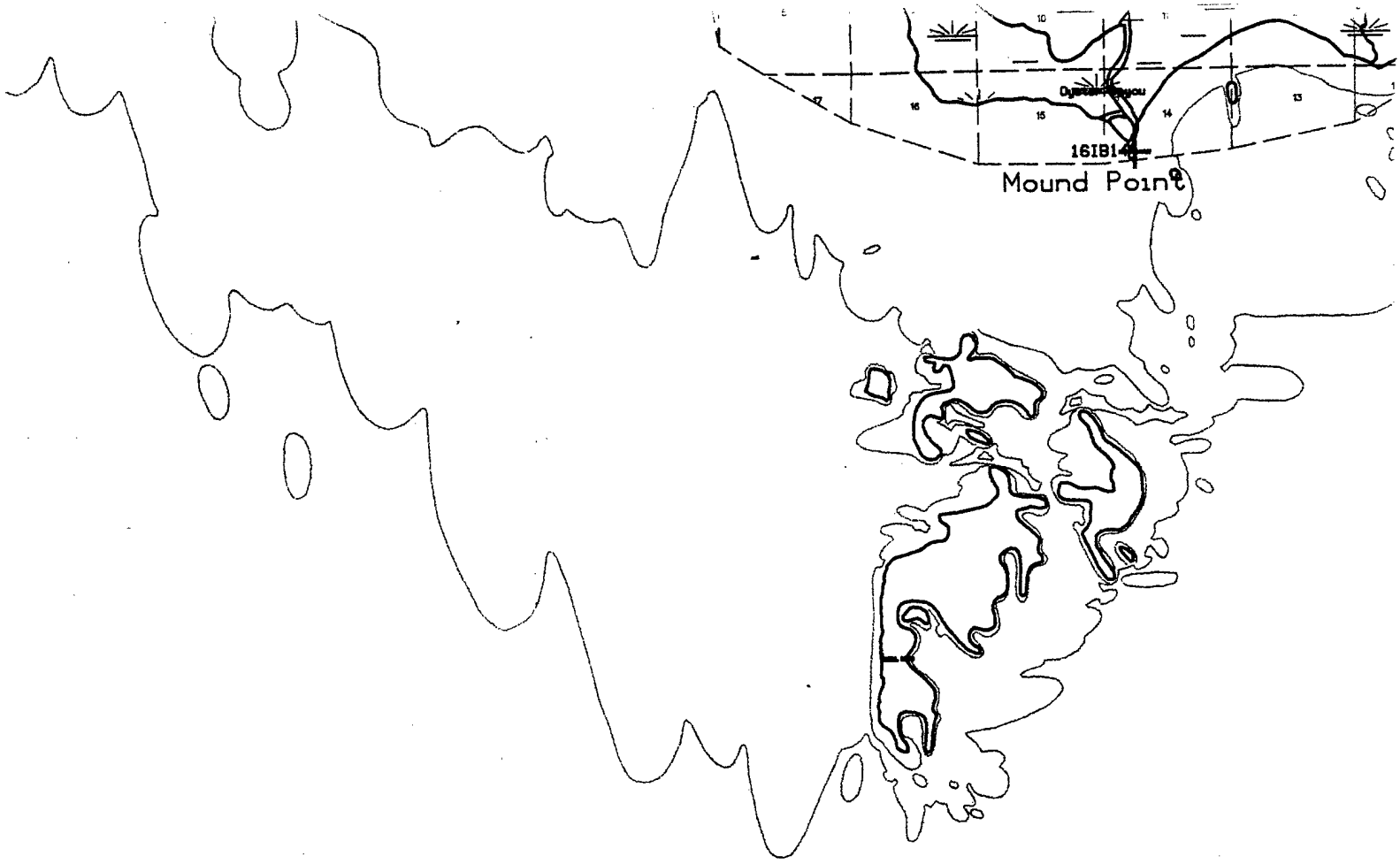

16SMY154
Point No Point
16SMY159
16SMY15
16SMY15
16SMY40
East Cote Blanche Bay
Oil and Gas Field
Bayou Sale Oil and Gas Field
Hog Bayou Lake
16SMY155
Mud Lake
16SMY8
16SMY118
16SMY117
East Cote Blanche Bay
Bayou Sale Bay
Point
Chevreuil
MORRISON CUTOFF
RABBIT ISLAND
16IB124


16SMY159
16SMY15
16SMY40
Pipeline canal
16SMY31
ote Blanche Bay
and Gas Field
Bayou Sale Island Gas Field
Hog Bayou Lake
16SMY155
Mud Lake
16SMY8
16SMY118
16SMY17
Pipeline
NEGRO HAMMOCK
16SMY32
Bayou Sale Bay
Goat Island
Grass Island
16SMY162
16SMY27
16SMY160
16SMY161
Belle Isle Point
Point Chevreuil
ON CUTOFF


pipeline canal
pipeline canal
pipeline canal
16SMY31
16SMY33
Hog Bayou Lake
Mud Lake
pipeline
pipeline
NEGRO HANNOCK
16SMY32
Goat Island
Grass Island
16SMY27
16SMY162
16SMY102
16SMY163
16SMY161
16SMY109
16SMY161
Belle Isle Point
Belle Isle Lake

c:\marshisland\dgn\marsh.dgn Jan. 14, 1999 11:47:53

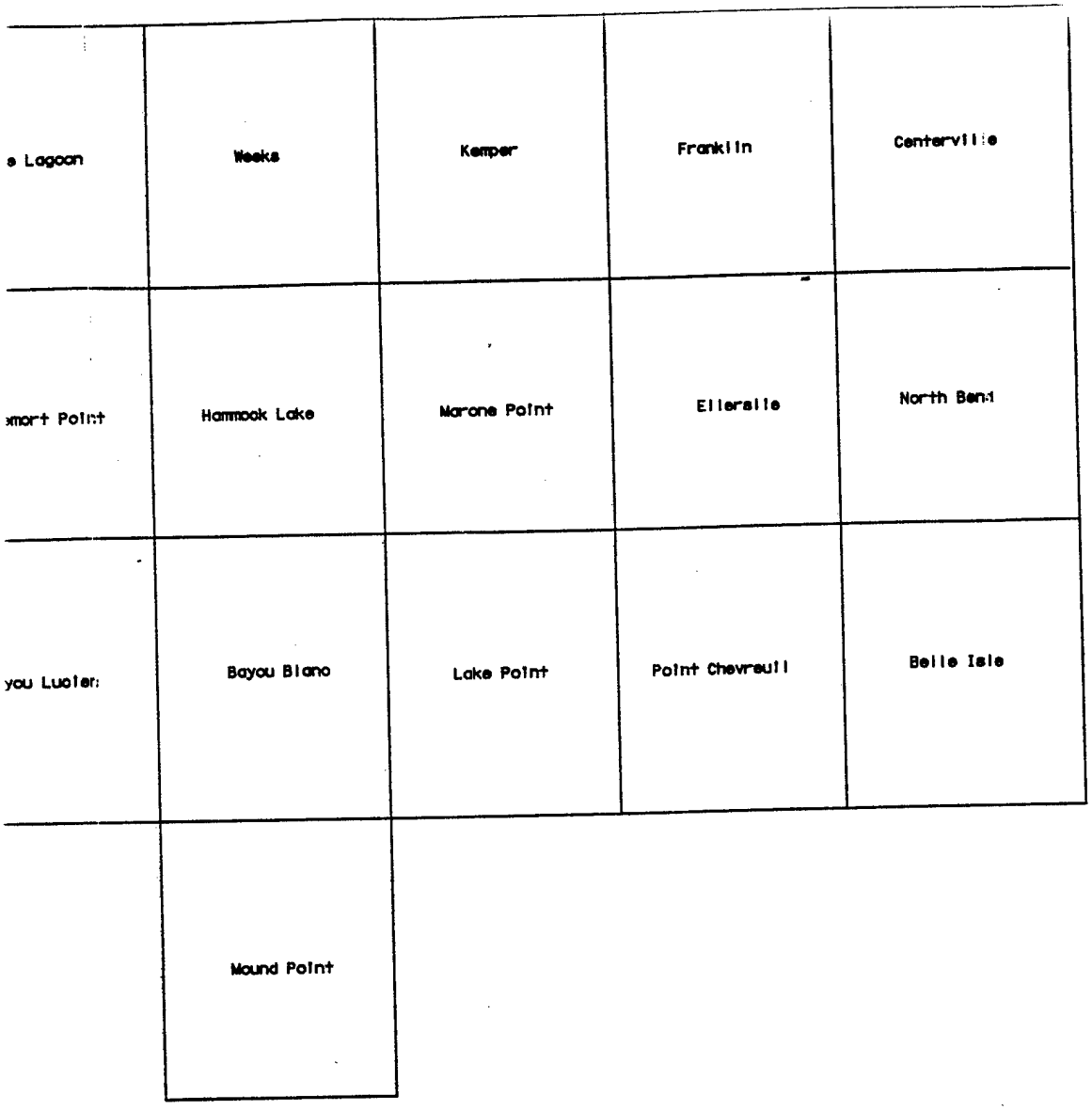



16IB14
Mound Point
Gulf of

Intracoastal City	Hebert Lake	Tigre Lagoon	
Fearman Lake	Redfish Point	Cypremort Point	Ha
Chenlere Au Tigre	Hell Hole Bayou	Bayou Lucier	

f of Mexico

+ PREVIOUSL



BASE
SYLV
INTR
HEBE
TIGR
WEEK
KEMP
FRAN
CENT
FEAR
REDF
CYPF
HAMM
MARC
ELLE
NOR
CHE
HELL
BAY
BAY
LAK
POIN
BEL
MOU

REVIOUSLY RECORDED SITE

enterville

lorth Bend

Belle Isle

BASE MAP COMPOSED OF 1994-95
SYLVAN ASCENT DIGITAL CD\MAPS:
INTRACOASTAL CITY, LOUISIANA
HEBERT LAKE, LOUISIANA
TIGRE LAGOON, LOUISIANA
WEEKS, LOUISIANA
KEMPER, LOUISIANA
FRANKLIN, LOUISIANA
CENTERVILLE, LOUISIANA
FEARMAN LAKE, LOUISIANA
REDFISH POINT, LOUISIANA
CYPREMORT POINT, LOUISIANA
HAMMOCK LAKE, LOUISIANA
MARONE POINT, LOUISIANA
ELLERSLIE, LOUISIANA
NORTH BEND, LOUISIANA
CHENIERE AU TIGRE, LOUISIANA
HELL HOLE BAYOU, LOUISIANA
BAYOU LUCIEN, LOUISIANA
BAYOU BLANC, LOUISIANA
LAKE POINT, LOUISIANA
POINT CHEVREUIL, LOUISIANA
BELLE ISLE, LOUISIANA
MOUND POINT, LOUISIANA

BASE MAP COMPOSED OF 1994-95
SYLVAN ASCENT DIGITAL CD\MAPS:
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BAYOU BLANC, LOUISIANA
LAKE POINT, LOUISIANA
POINT CHEVREUIL, LOUISIANA
BELLE ISLE, LOUISIANA
MOUND POINT, LOUISIANA